LG TRAINING CENTER

Training Manual

42PG20 Plasma Display

Advanced Single Scan Troubleshooting

LG

Life's Good

Overview of Topics to be Discussed

Section 1

Contact Information, Preliminary Matters, Specifications, Plasma Overview, General Troubleshooting Steps, Disassembly Instructions, Voltage and Signal Distribution

Section 2

Circuit Board Operation, Troubleshooting and Alignment of :

- Switch mode Power Supply
- NEW • UNIFIED Y and Z SUS Board (Z SUS Drive signals developed)
- Y Drive Boards (Receives Y Drive signals from Y-SUS PWB)
- NEW • Z SUS Output Board (Receives Z SUS signals from Y-SUS PWB)
- NEW • Control Board (Outputs Y and Z control signals to Y SUS PWB)
- X Drive Boards (2)
- Main Board

42PG20 Plasma Display

Section 1

This Section will cover Contact Information and remind the Technician of Important Safety Precautions for the Customers Safety as well as the Technician and the Equipment.

Basic Troubleshooting Techniques which can save time and money sometimes can be overlooked. These techniques will also be presented.

This Section will get the Technician familiar with the Disassembly, Identification and Layout of the Plasma Display Panel.

At the end of this Section the Technician should be able to Identify the Circuit Boards and have the ability and knowledge necessary to safely remove and replace any Circuit Board or Assembly.

IMPORTANT SAFETY NOTICE

The information in this training manual is intended for use by persons possessing an adequate background in electrical equipment, electronic devices, and mechanical systems. In any attempt to repair a major Product, personal injury and property damage can result. The manufacturer or seller maintains no liability for the interpretation of this information, nor can it assume any liability in conjunction with its use. When servicing this product, under no circumstances should the original design be modified or altered without permission from LG Electronics. Unauthorized modifications will not only void the warranty, but may lead to property damage or user injury. If wires, screws, clips, straps, nuts, or washers used to complete a ground path are removed for service, they must be returned to their original positions and properly fastened.

CAUTION

To avoid personal injury, disconnect the power before servicing this product. If electrical power is required for diagnosis or test purposes, disconnect the power immediately after performing the necessary checks. Also be aware that many household products present a weight hazard. At least two people should be involved in the installation or servicing of such devices. Failure to consider the weight of an product could result in physical injury.

ESD NOTICE (Electrostatic Static Discharge)

Today's sophisticated electronics are electrostatic discharge (ESD) sensitive. ESD can weaken or damage the electronics in a manner that renders them inoperative or reduces the time until their next failure. Connect an ESD wrist strap to a ground connection point or unpainted metal in the product. Alternatively, you can touch your finger repeatedly to a ground connection point or unpainted metal in the product. Before removing a replacement part from its package, touch the anti-static bag to a ground connection point or unpainted metal in the product. Handle the electronic control assembly by its edges only. When repackaging a failed electronic control assembly in an anti-static bag, observe these same precautions.

REGULATORY INFORMATION

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna; Increase the separation between the equipment and the receiver; Connect the equipment to an outlet on a different circuit than that to which the receiver is connected; or consult the dealer or an experienced radio/TV technician for help.

CONTACT INFORMATION

Customer Service (and Part Sales)	**(800) 243-0000**
Technical Support (and Part Sales)	**(800) 847-7597**
USA Website (GCSC)	**aic.lgservice.com**
Customer Service Website	**us.lgservice.com**
LG CS Academy	**lgcsacademy.com**
LG Web Training	**lge.webex.com**

Published March 2009 by LG Technical Support and Training

LG Electronics Alabama, Inc.
201 James Record Road,
Huntsville, AL, 35813.

Previous models glass thickness was 2.8mm

This unit 1.8mm thickness

Safety & Handling Regulations

1. Approximately 10 minute pre-run time is required before any adjustments are performed.
2. Refer to the Voltage Sticker inside the Panel when making adjustments on the Power Supply, Y SUS and Z SUS Boards. Always adjust to the specified voltage level (+/- ½ volt).
3. Be cautious of electric shock from the PDP module since the PDP module uses high voltage, check that the Power Supply and Drive Circuits are completely discharged because of residual current stored before Circuit Board removal.
4. C-MOS circuits are used extensively for processing the Drive Signals and should be protected from static electricity.
5. The PDP Module must be carried by two people. **Always carry vertical NOT horizontal.**
6. **The Plasma television should be transported vertical NOT horizontal.**
7. Exercise care when making voltage and waveform checks to prevent costly short circuits from damaging the unit.
8. Be cautious of lost screws and other metal objects to prevent a possible short in the circuitry.
9. **New Panels and Frames are much thinner than previous models. Be Careful with flexing these panels. Be careful with lifting Panels from a horizontal position. Damage to the Frame mounts or panel can occur.**

Checking Points to be Considered

1. Check the appearance of the Replacement Panel and Circuit Boards for both physical damage and part number accuracy.
2. Check the model label. Verify model names and board model matches.
3. Check details of defective condition and history. Example: Y Board Failure, Mal-discharge on screen, etc.

Basic Troubleshooting Steps

Define, Localize, Isolate and Correct

•**Define** Look at the symptom carefully and determine what circuits could be causing the failure. Use your senses Sight, Smell, Touch and Hearing. Look for burned parts and check for possible overheated components. Capacitors will sometimes leak dielectric material and give off a distinct odor. Frequency of power supplies will change with the load, or listen for relay closing etc. **Observation of the front Power LED may give some clues.**

•**Localize** After carefully checking the symptom and determining the circuits to be checked and after giving a thorough examination using your senses the first check should always be the DC Supply Voltages to those circuits under test. Always confirm the supplies are not only the proper level but be sure they are noise free. If the supplies are missing check the resistance for possible short circuits.

•**Isolate** To further isolate the failure, check for the proper waveforms with the Oscilloscope to make a final determination of the failure. Look for correct Amplitude Phasing and Timing of the signals also check for the proper Duty Cycle of the signals. Sometimes "glitches" or "road bumps" will be an indication of an imminent failure.

•**Correct** The final step is to correct the problem. Be careful of ESD and make sure to check the DC Supplies for proper levels. Make all necessary adjustments and lastly always perform a Safety AC Leakage Test before returning the product back to the Customer.

42PG20 Product Information

This section of the manual will discuss the specifications of the 42PG20 Advanced Single Scan Plasma Display Panel.

720P PLASMA HDTV

42” Class (41.5” diagonal)

- **720p HD Resolution**
- **Dual XD Engine™**
- **20,000:1 Contrast Ratio**
- **Fluid Motion**
- **3x HDMI™ V.1.3 with Deep Color**
- **AV Mode (Cinema, Sports, Game)**
- **Clear Voice**
- **LG SimpLink™ Connectivity**
- **Invisible Speaker System**
- **100,000 Hours to Half Brightness (Typical)**
- **PC Input**

42PG20 Specifications Logo Familiarization

HD RESOLUTION 720p HD Resolution Pixels: 1024 (H) × 768 (V)
High definition television is the highest performance segment of the DTV system used in the US. It's a wide screen, high-resolution video image, coupled with multi-channel, compact-disc quality sound.

FORMATS

NTSC	480I	Interlaced	240 Lines
SD	480P	Progressive	480 Lines
HD	1080I	Interlaced	540 Lines
HD	720P	Progressive	720 Lines
HD	1080P	Progressive	1080 Lines

Possible Frame Rates:
24FPS
30FPS
60FPS

Interlaced
2 Fields to make a Frame

Progressive
Each Field is a Frame

BASIC PIXEL COUNTS

PLASMA
1365 (H) × 768 (V)

LCD DV
1920 (H) x 1080 (V)

Think of sync as the Panels "Refresh Rate"

42PG20 Specifications Logo Familiarization

HD RESOLUTION 720p HD Resolution Pixels: 1024 (H) × 768 (V)
High definition television is the highest performance segment of the DTV system used in the US. It's a wide screen, high-resolution video image, coupled with multi-channel, compact-disc quality sound.

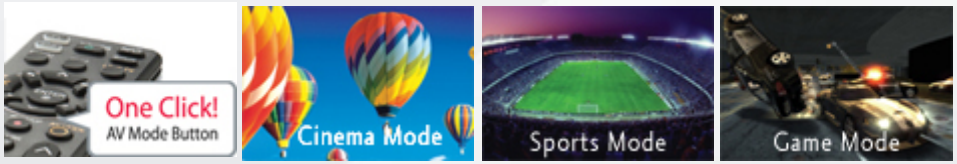
HDMI (1.3 Deep Color) Digital multi-connectivity
HDMI (1.3 Deep color) provides a wider bandwidth (340MHz, 10.2Gbps) than that of HDMI 1.2, delivering a broader range of colors, and also drastically improves the data-transmission speed.

LG SIMPLINK™ MULTI-DEVICE CONTROL
Allows for convenient control of other LG SimpLink products using the existing HDMI connection.

Dual XD Engine
Realizing optimal quality for all images
One XD Engine optimizes the images from RF signals as another XD Engine optimizes them from External inputs. Dual XD Engine presents images with optimal quality two times higher than those of previous models.

42PG20 Specifications Logo Familiarization

AV Mode "One click" - Cinema, Sports, Game mode.
TAKE IT TO THE EDGE is a true multimedia TV with an AV Mode which allows you to choose from 3 different modes of Movies, Video Games and Sports by a single click of a remote control.



Clear Voice Clearer dialogue sound
Automatically enhances and amplifies the sound of the human voice frequency range to provide high-quality dialogue when background noise swells.

Save Energy, Save Money
Home electronic products use energy when they're off to power features like clock displays and remote controls. Those that have earned the ENERGY STAR use as much as 60% less energy to perform these functions, while providing the same performance at the same price as less-efficient models. Less energy means you pay less on your energy bill. Draws less than 1 Watt in stand by.

42PG20 Specifications Logo Familiarization

Tru-Surround is a sound-scheme that has the ability to take multi-channel encoded sources, such as Dolby Digital, and reproduce the multi-channel surround effect by just using two-speakers. The result is not as impressive as true Dolby Digital 5.1 (the front and side surround effects are impressive, but the rear surround effects fall a little short, with the sense they are coming from just to rear of your head rather than from the back of the room).

Dolby® Digital
In thousands of cinemas and millions of homes worldwide, Dolby Digital is the reigning standard for surround sound technology in general and 5.1-channel surround sound in particular.

Invisible Speaker
Personally tuned by Mr. Mark Levinson for LG
TAKE IT TO THE EDGE newly introduces 'Invisible Speaker' system, guaranteeing first class audio quality personally tuned by Mr. Mark Levinson, world renowned as an audio authority. It provides Full Sweet Spot and realistic sound equal to that of theaters with its Invisible Speaker.

FluidMotion (180 Hz Effect)

Enjoy smoother, clearer motion with all types of programming such as sports and action movies.
The moving picture resolution give the impression of performance of up to 3x the panels actual refresh rate.

FluidMotion (180 Hz Effect)

Enjoy smoother, clearer motion with all types of programming such as sports and action movies.
The moving picture resolution give the impression of performance of up to 3x the panels actual refresh rate.

LCD 60Hz

PDP 180Hz

Moving Picture Response Time is 16.5 milliseconds
(120Hz takes MPRT to 8.25ms)

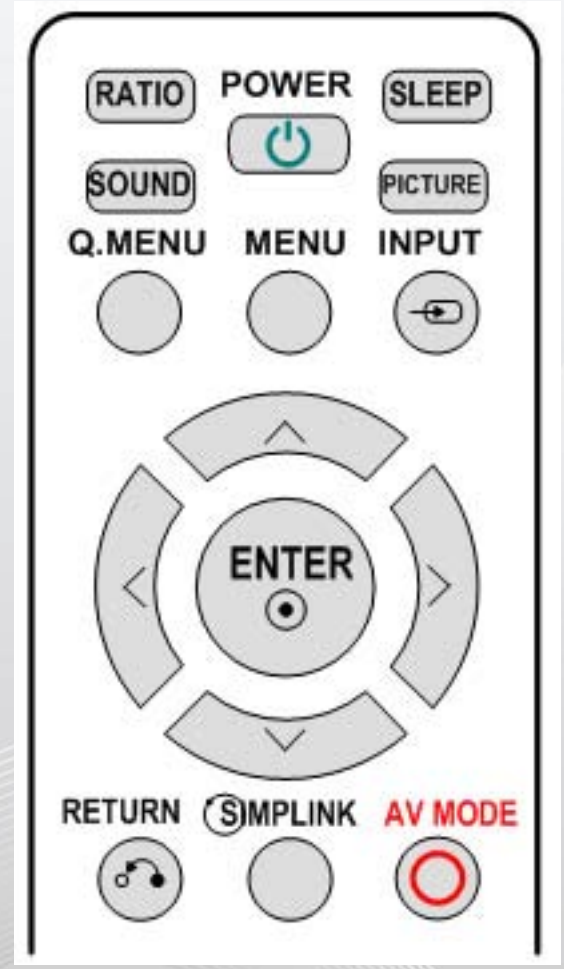
Panel Response Time is 4 to 8 milliseconds

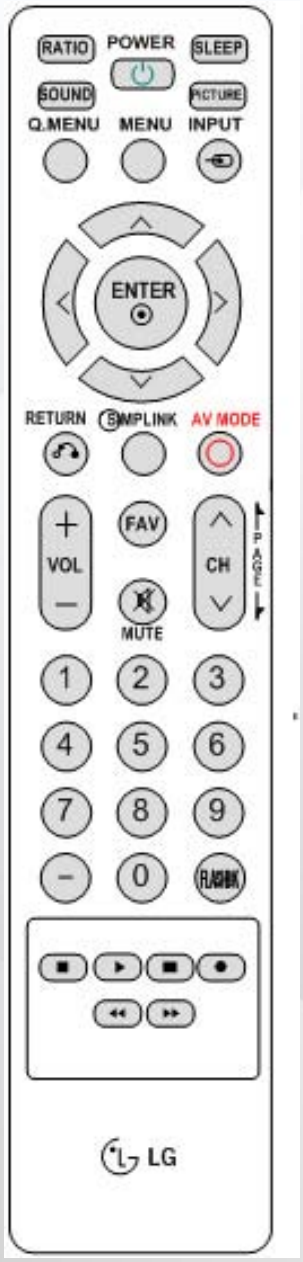
Moving Picture Response Time is 5.44 milliseconds

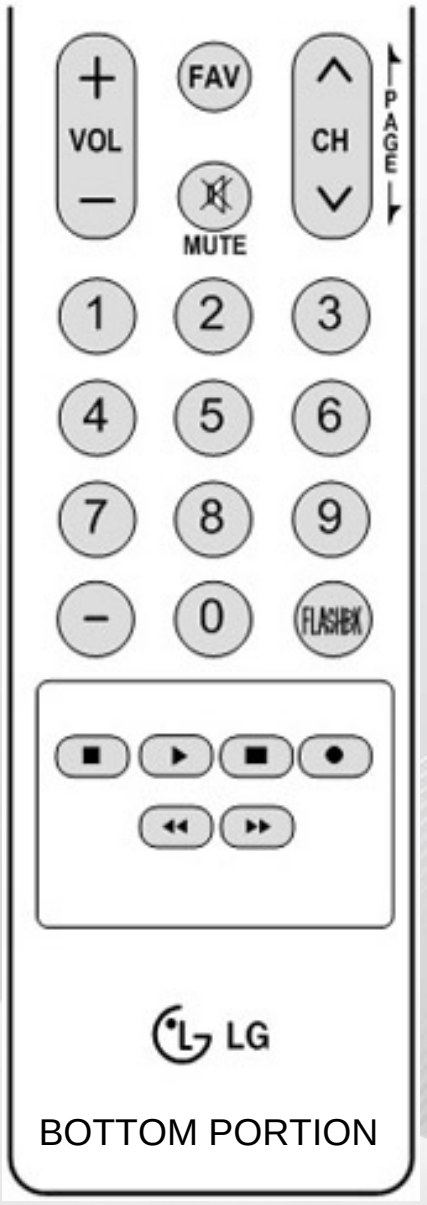
Panel Response Time is less than 1 millisecond

42PG20 Remote Control

TOP PORTION

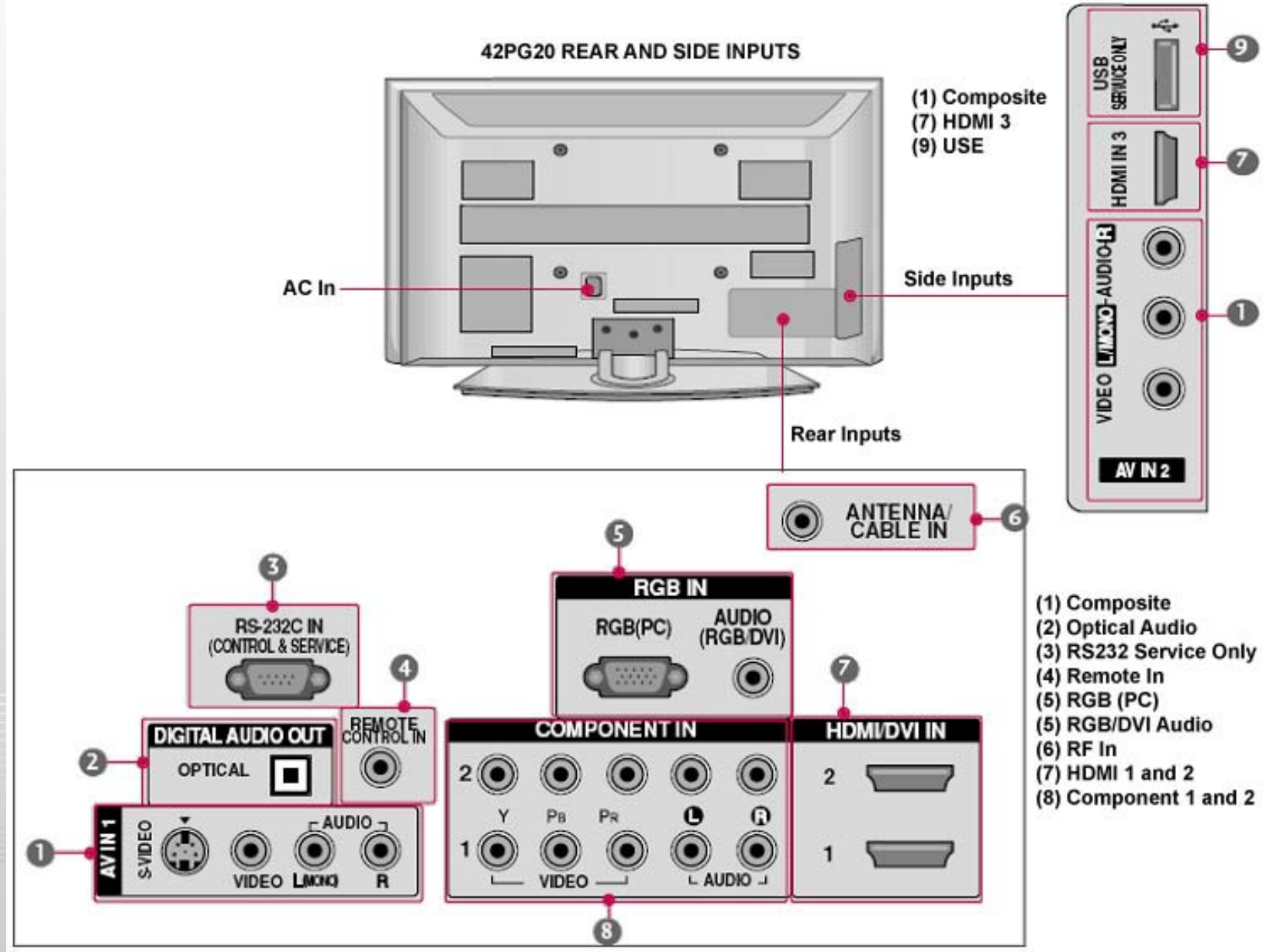




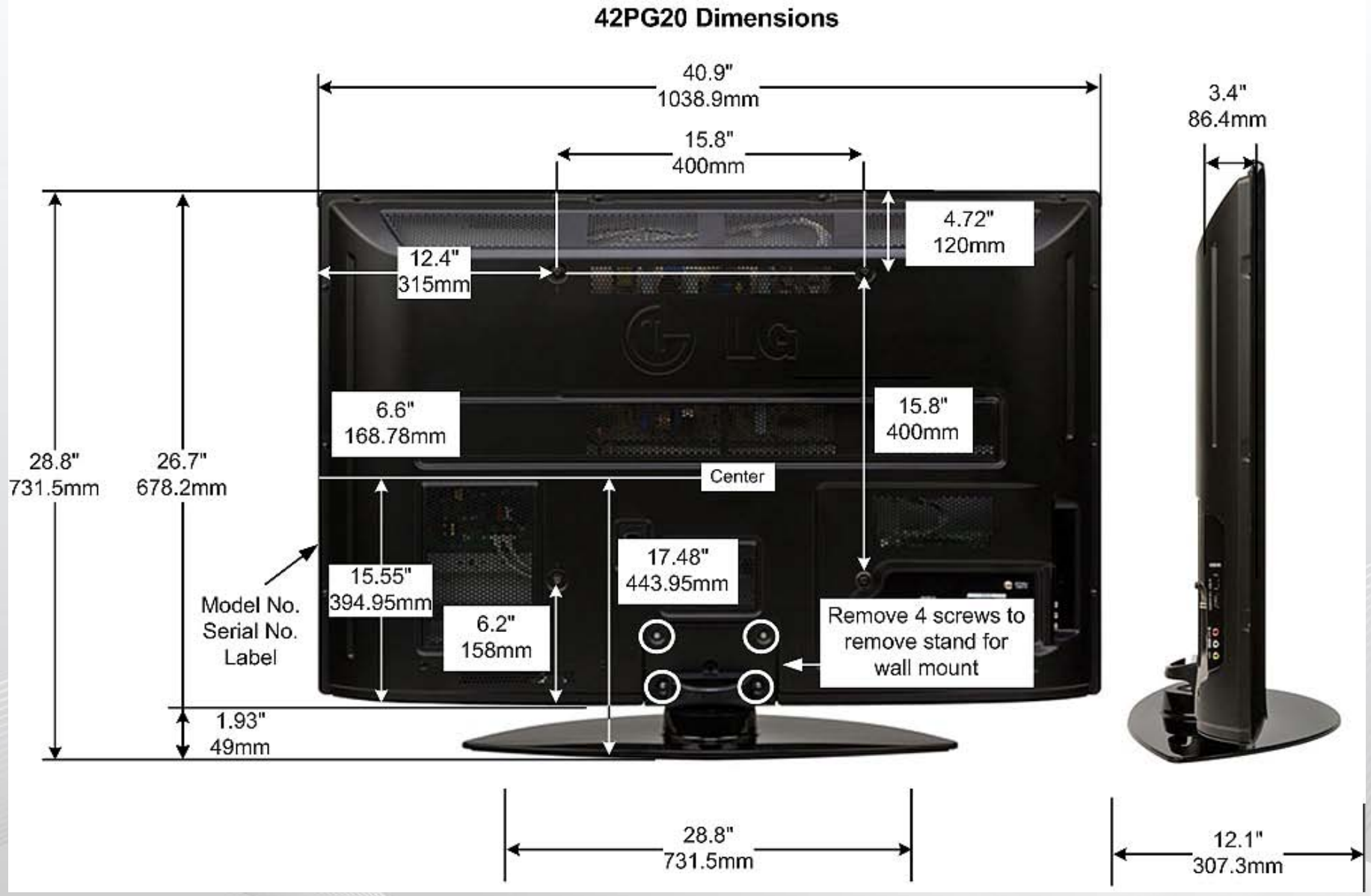


BOTTOM PORTION

Rear Input Jacks



42PG20 Dimensions

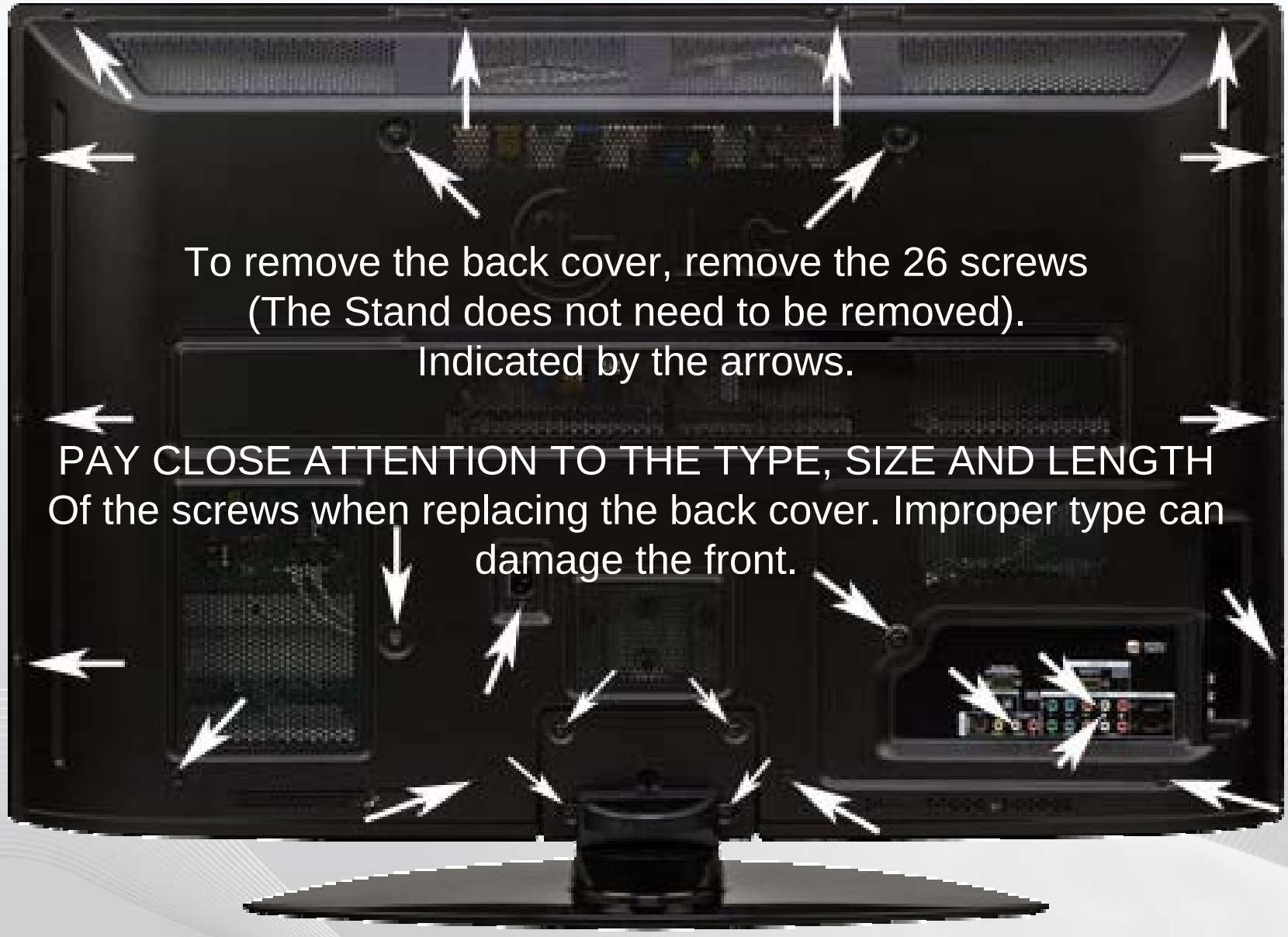


DISASSEMBLY SECTION

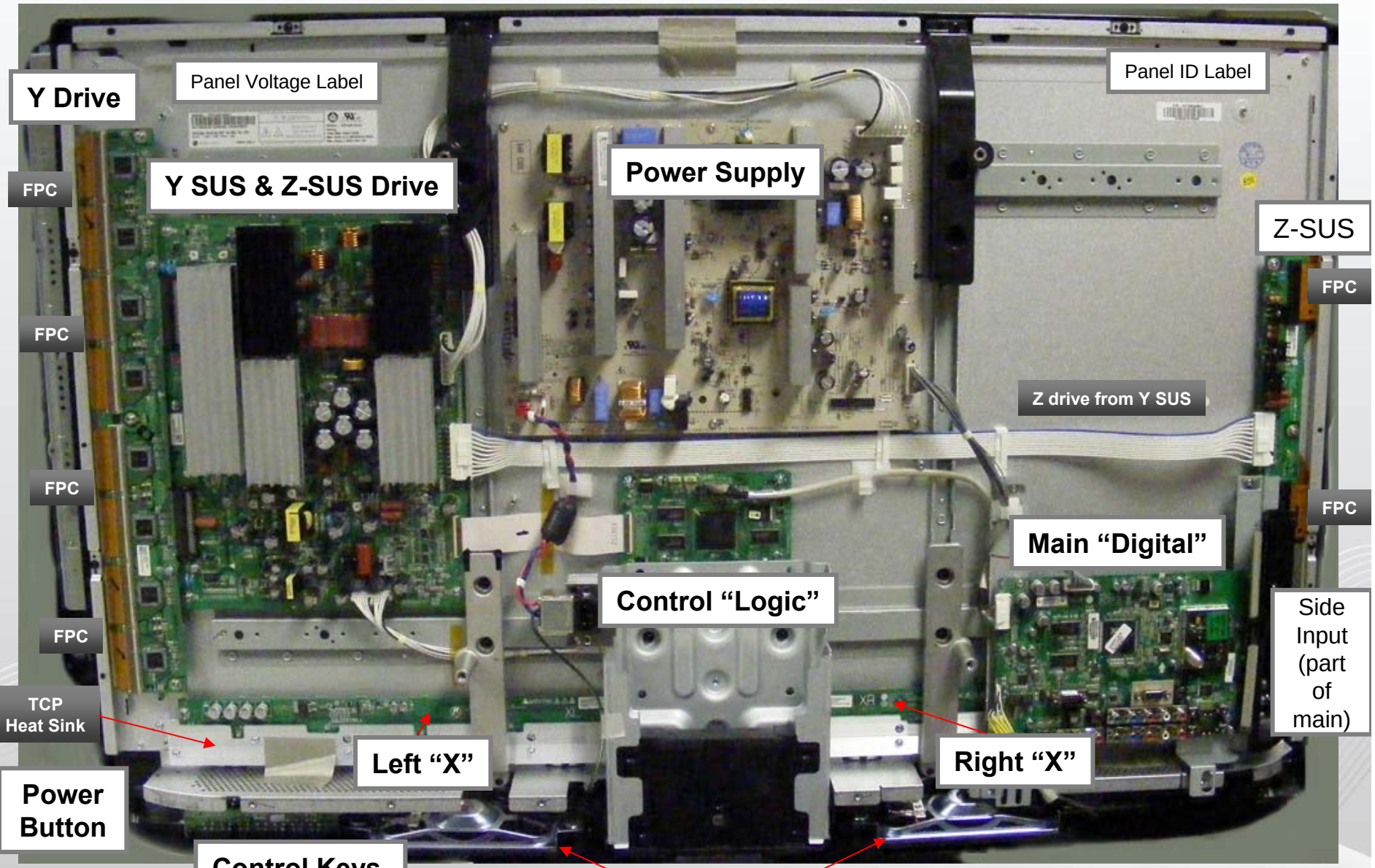
This section of the manual will discuss Disassembly, Layout and Circuit Board Identification, of the 42PG20 Advanced Single Scan Plasma Display Panel.

Upon completion of this section the Technician will have a better understanding of the disassembly procedures, the layout of the printed circuit boards and be able to identify each board.

42PG20 Removing the Back Cover



42PG20 Circuit Board Layout



Disassembly Procedure for Circuit Board Removal

Notes: 1) All Plugs listed are from left to right Pin 1,2, 3, ETC.
2) Remember to be cautious of ESD as some semiconductors are CMOS and prone to static failure

Switch Mode Power Supply Board Removal

Disconnect the following connectors: P812, P813, CN101
Remove the 8 screws holding the PWB in place
Remove the PWB
When replacing, be sure to readjust the Va/Vs voltages in accordance with the Panel Label.
Confirm VSC, -Vy and Zbias as well.

Y-SUS Board Removal

Disconnect the following connectors: P201, P801, P101, P202
Remove the 8 screws holding the PWB in place
Remove the PWB
When replacing, be sure to readjust the Va/Vs voltages in accordance with the Panel Label.
Confirm VSC, -Vy and Zbias as well.

Y Drive Board Removal

Disconnect the following Flexible Ribbon Connectors: P1, P2, P3, P4, P5, P6, P7 and P8
Disconnect the following connectors: P201, P801, P101, P202
Remove the 3 screws holding the PWB in place
Remove the PWB by lifting slightly and sliding the PWB to the left unseating P204 and P200 from the Y-SUS PWB

Disassembly Procedure for Circuit Board Removal (2)

Z-SUS Board Removal

Remove the support frame holding the Main PWB
Disconnect the following connector: P1
Remove the 3 screws holding the PWB in place and Disconnect the following connectors: P2 and P3
Remove the PWB.
When replacing, be sure to readjust the Va/Vs voltages in accordance with the Panel Label.
Confirm VS, -Vy and Zbias as well.

Main Board Removal

Disconnect the following connectors: P701, P302, P303 and JK501
Remove the 2 screws holding on the decorative plastic piece on the right side
Remove the 4 screws holding the PWB in place and Remove the PWB.

Control Board Removal

Disconnect the following connectors: P121, P160, P161 and P162
Remove the 4 screws holding the PWB in place Remove the PWB.

X-Drive Boards Removal

Disconnect the following connectors: P232, P211, P311 and P331
Remove the 13 screws holding the Heat Sink in place
Disconnect the following connectors: P201 through P206 and P301 through P306
Remove the 4 screws holding each of the X Drive PWBs in place (8 total)
Remove the PWBs.

Control Button PWB Removal

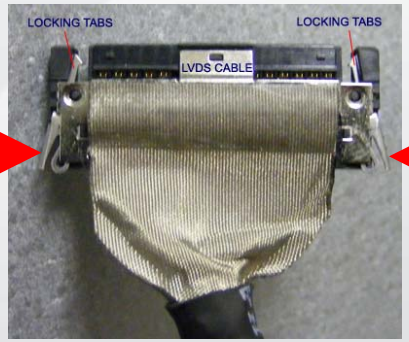
Disconnect the single connector P101. Remove the 2 screws holding the PWB in place Remove the PWB. (Note: Power PWB is behind the Control PWB. Remove it's 2 screws and remove.

X Circuit Board Removal Continued

X Board Removal (continued)

Lay the Plasma down carefully on a padded surface.
Make sure AC is removed and remove the Back Cover and the Stand.
Carefully remove the LVDS Cable **P121** from the Control Board by pressing the Locking Tabs together and Pull the connector straight back to remove the cable see illustration below. (This prevents damage).

Press Inward



Press Inward

LVDS Cable Connector

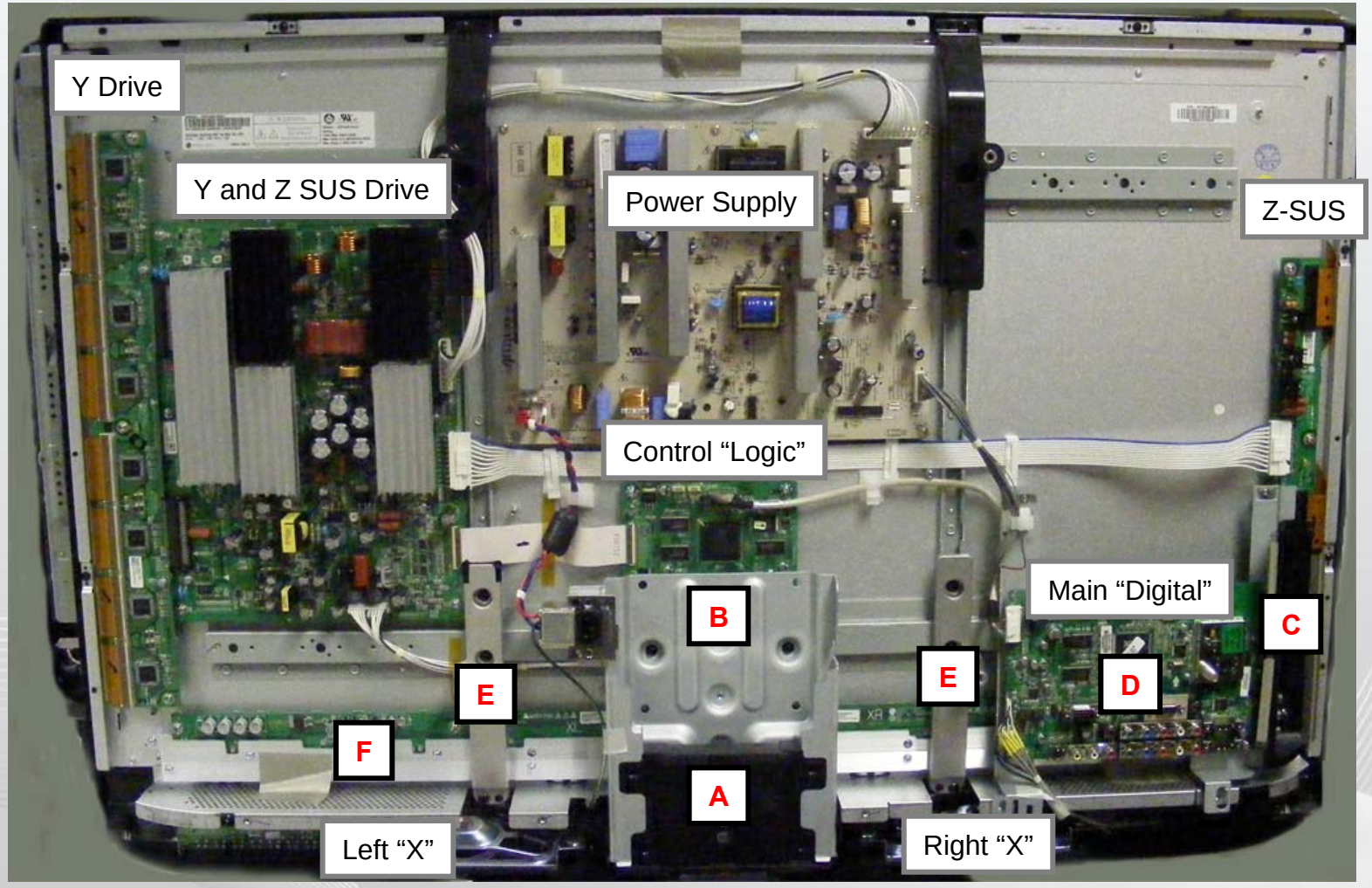
(A) Remove the Stand mounting support plastic piece.
(B) Remove the Stand Metal Support Bracket, unplug AC ground lug.
(C) Remove the 2 screws from the decorative black plastic piece around side input jacks (Marked B) and remove.
(D) Remove the 2 screws at the top of the Main Board Mounting Bracket and peel the tape from the bottom. Remove connector P303 and JK501. Carefully reposition the Main Board and Mounting Bracket up and off to the right side.
(E) Remove the metal support Brackets marked “E”.
(F) Remove the 13 screws holding the Heat Sink and carefully lift it straight up and off (remember that the TCP IC’s are located under the HEAT SINK).

X-DRIVE PWBs REMOVAL:
Disconnect all TCP ribbon cables from the defective X-Drive PWB. Remove the 5 screws holding the PWB in place. Remove the PWB. Reassemble in reverse order. Recheck Va/Vs/VScan/-VY/Z-Drive.

X Circuit Board Removal

X Board Removal

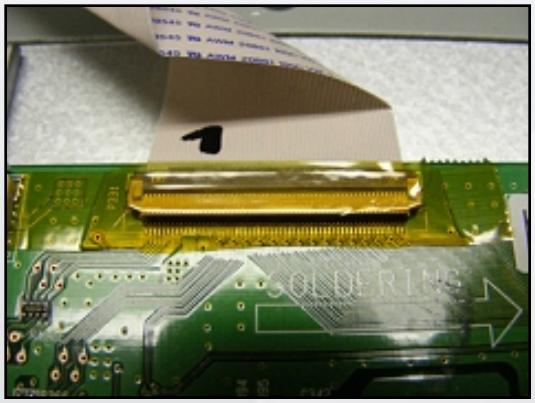
X Board Removal will require the most disassembly of all the boards. All the Brackets and Assemblies marked with “A~F” will need to be removed this includes the Stand. Before an X Board can be removed the Heat Sink Assembly “F” must be removed.



Left and Right X Drive Removal

After removing the back cover, Main PWB is lifted out of the way, 15 screws removed from heat sink covering TCPs and heat sink removed, the X-Drive PWBs can be removed.

Showing the tape on the connectors P232 or P331



Peel the tape off the connectors

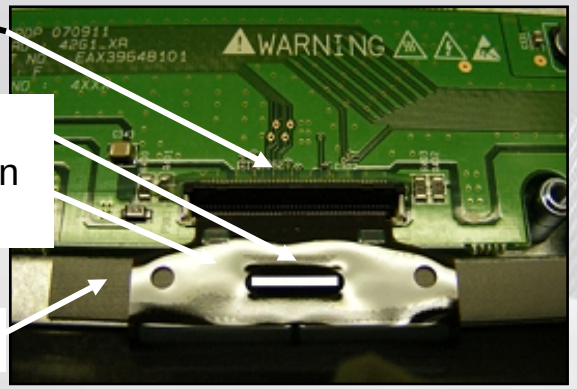
Gently pry the locking mechanism upward

Gently lift the locking mechanism upward on all TCP connectors P201~206 or P301~306

Carefully lift the TCP ribbon up and off the cushion and out of the way.

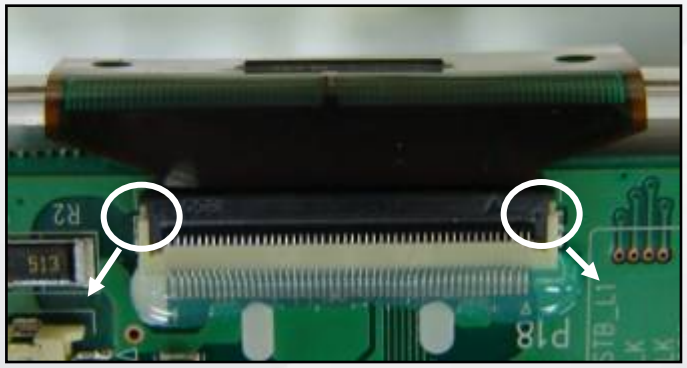
TCP Flexible ribbon cable

Cushion

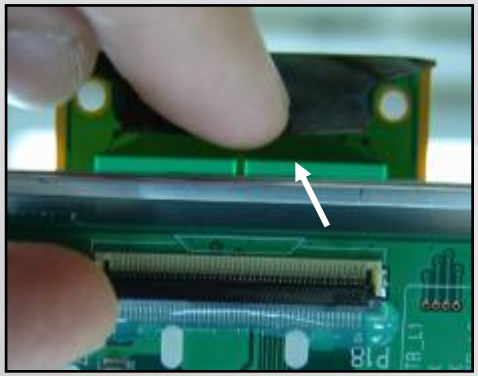


TCP (Tape Carrier Package) Precautions

TCP Connector Removal



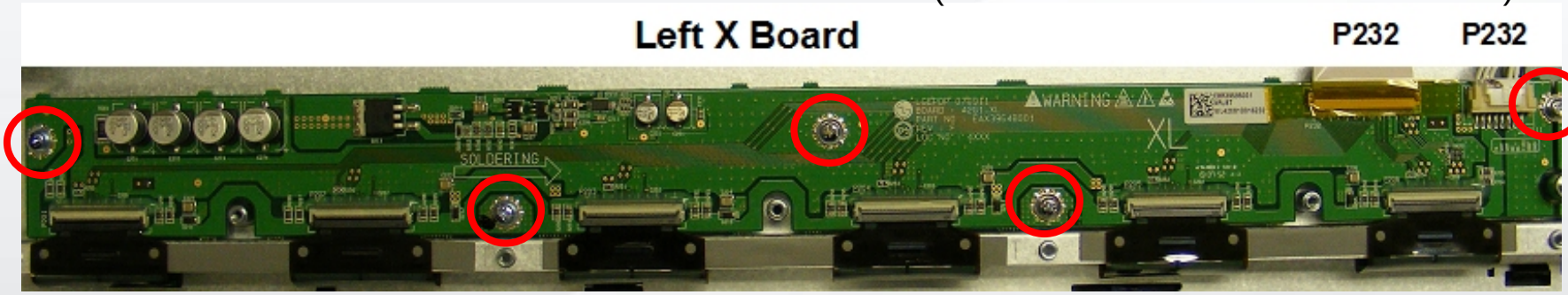
Lift up the lock as shown by arrows.
(The Lock can be easily broken.
It needs to be handled carefully.)



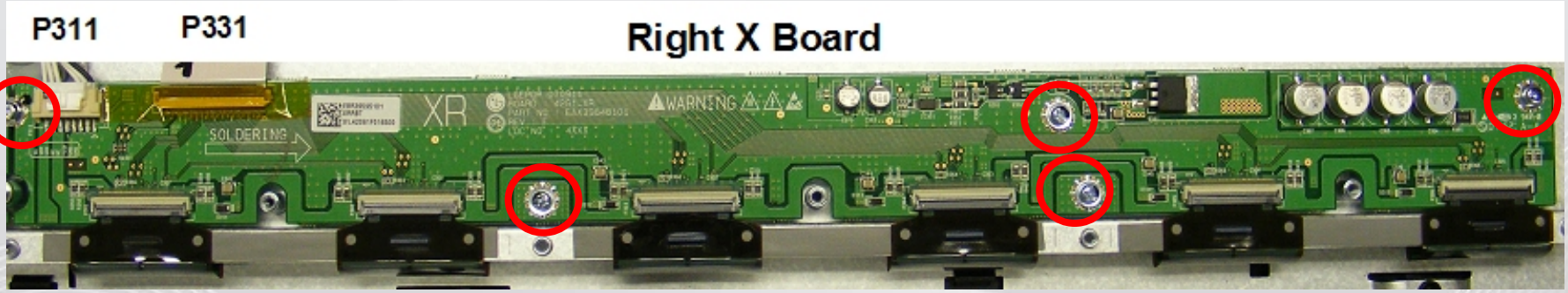
Pull TCP apart as shown by arrow.
(TCP Film can be easily damaged.
Handle with care.)

Left and Right X Drive Removal

Remove the 5 screws for either PWB or 9 total for both. (The Center screw secures both PWBs)



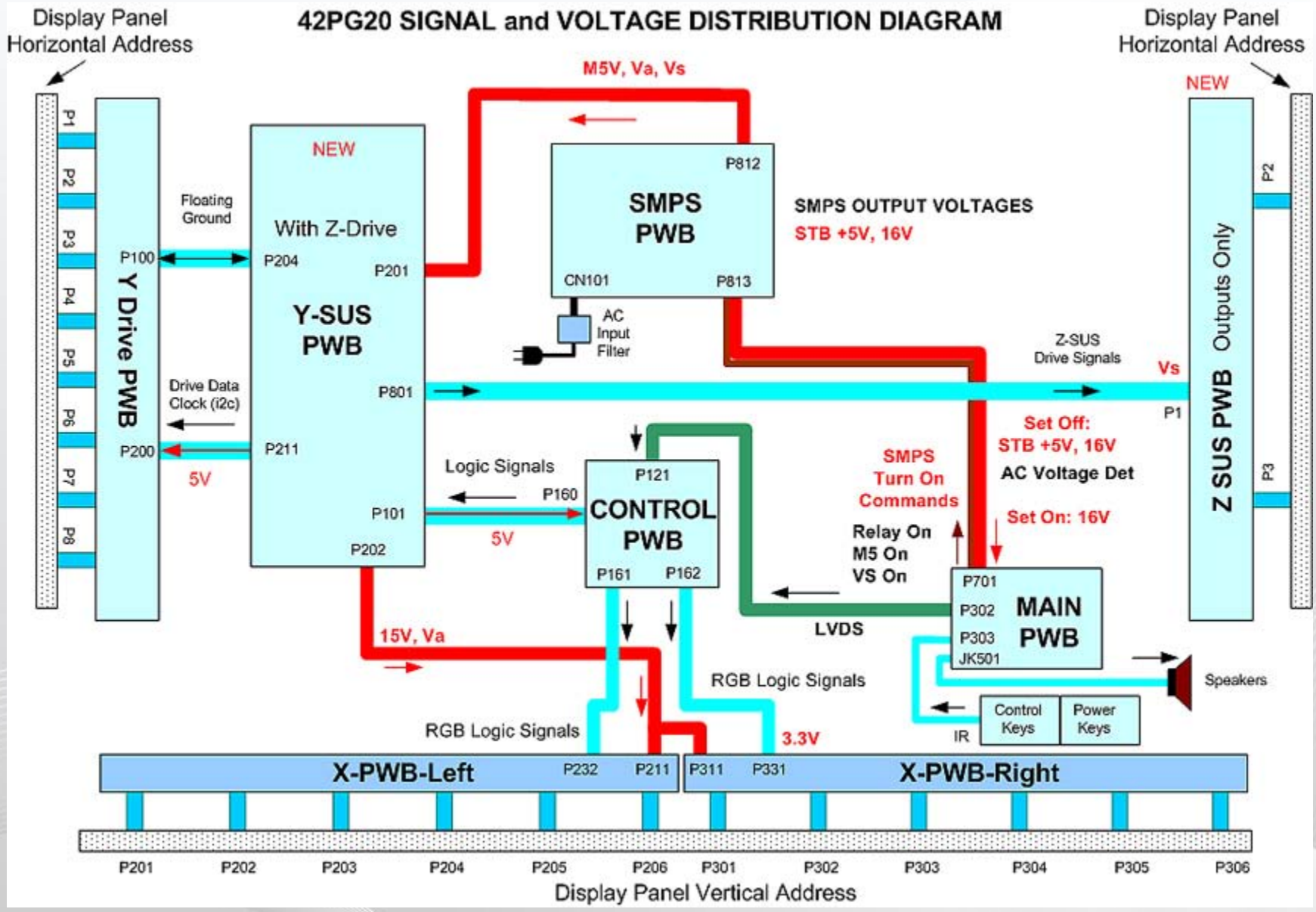
Left X Board drives the right side of the screen



Right X Board drive the left side of the screen

Signal and Voltage Distribution

SLIDE CORRECTED HANDOUT MANUAL ERROR



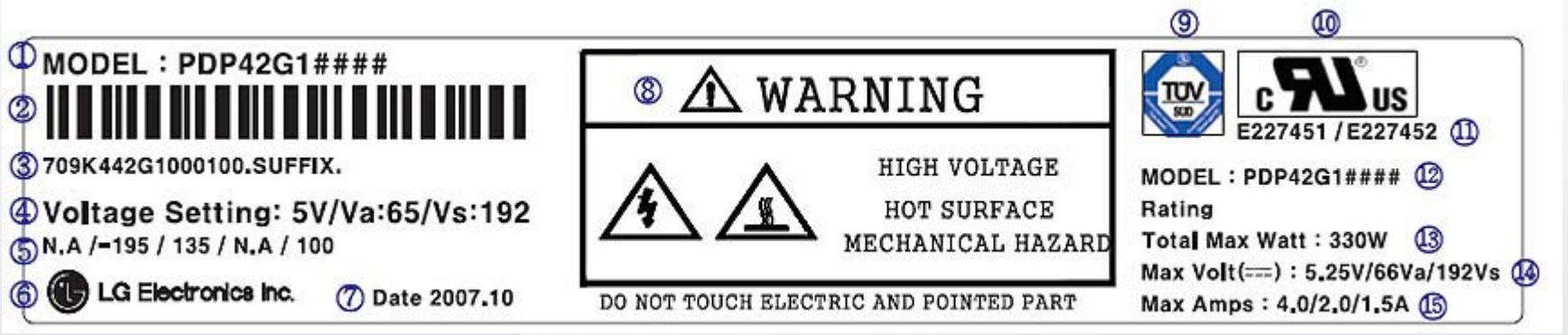
42PG20 Plasma Display

This Section will cover Circuit Operation, Troubleshooting and Alignment of the Power Supply, Y-SUS Board, Y Drive Boards, Z-SUS Board, Control Board, Main Board and the X Drive Boards.

Remember, the Z-SUS Drive section is now located on the Y-SUS PWB. But it will be described separately.

At the end of this Section the technician should understand the operation of each circuit board and how to adjust the controls. The technician should be able with confidence to troubleshoot a circuit board failure, replace the defective circuit and perform all necessary adjustments.

PANEL LABEL EXPLANATION



(1) Model Name
(2) Bar Code
(3) Manufacture No.
(4) Adjusting Voltage DC, Va, Vs
(5) Adjusting Voltage (Set Up / -Vy / Vsc / Ve / Vzb)
(6) Trade name of LG Electronics
(7) Manufactured date (Year & Month)
(8) Warning
(9) TUV Approval Mark
(10) UL Approval Mark
(11) UL Approval No.
(12) Model Name
(13) Max. Watt (Full White)
(14) Max. Volts
(15) Max. Amps

ADJUSTMENT NOTICE

When ever a new PWB is received from parts,
CENTER ALL ADJUSTMENT POTS before installing the PWB.
Example: If Ramp Up on the Y-SUS is too high, the set will shut down.

It is critical that the DC Voltage adjustments be checked when ever;

1) SMPS, Y-SUS or Z-SUS PWB is replaced.
2) Panel is replaced, since the SMPS does not come with new panel
3) A Picture issue is encountered
4) As a general rule of thumb when ever the back is removed

ADJUSTMENT ORDER "IMPORTANT"

DC VOLTAGE ADJUSTMENTS

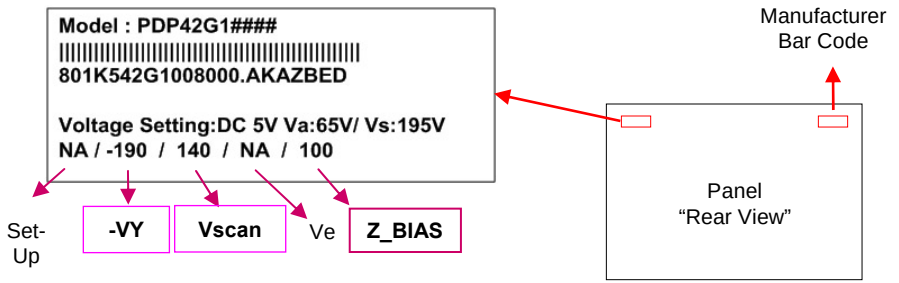
1) **SMPS PWB: Vs Va** (Always do SMPS first)
2) **Y-SUS PWB: Adjust –Vy, Vscan,**
3) **Z-SUS PWB: Adjust Zbias**

WAVEFORM ADJUSTMENTS

1) **Y-SUS PWB: Ramp Up, Ramp Down**

The Waveform adjustment is only necessary
1) When the Y-SUS PWB is replaced
2) When a "Mal-Discharge" problem is encountered
3) When an abnormal picture issues is encountered

Remember, the Voltage Label MUST be followed,
it is specific to the panel's needs.



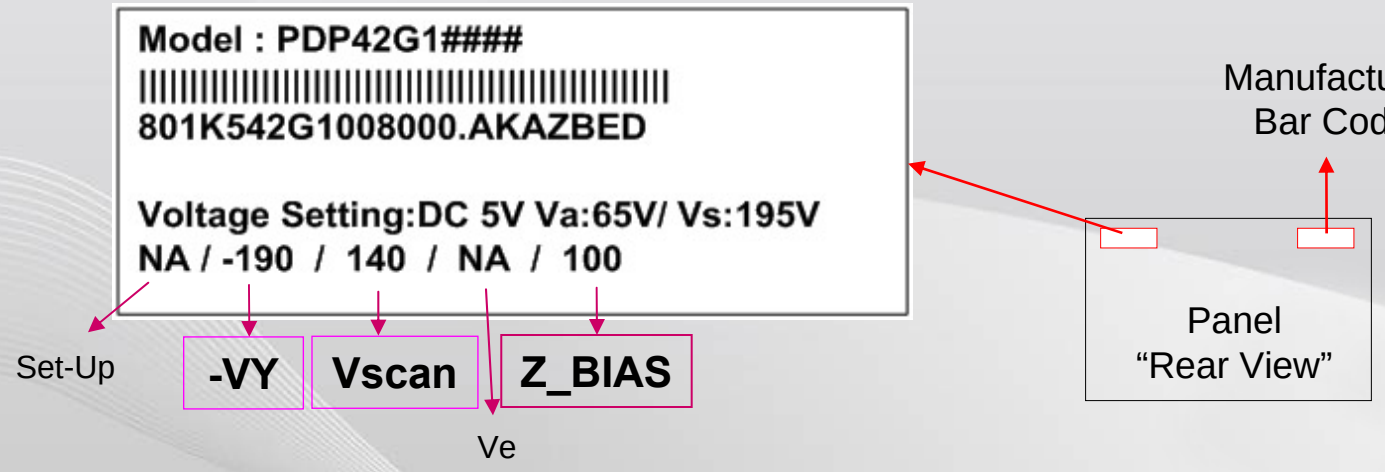
All label references are from a specific panel.
They are not the same for every panel encountered.

SWITCH MODE POWER SUPPLY Troubleshooting

42PG20

This Section of the Presentation will cover troubleshooting the Switch Mode Power Supply for the Single Scan Plasma. Upon completion of the section the technician will have a better understanding of the operation of the Power Supply Circuit and will be able to locate voltage and test points needed for troubleshooting and alignments.

- DC Voltages developed on the SMPS
- Adjustments VA and VS.
- Always refer to the Voltage Sticker located on the back of the panel, in the upper Left Hand side for the correct voltage levels for the VA, VS, -VY, Vscan, and Z Bias as these voltages will vary from Panel to Panel even in the same size category.
- Set-Up and Ve are just for Label location identification and are not used with this panel.



42PG20

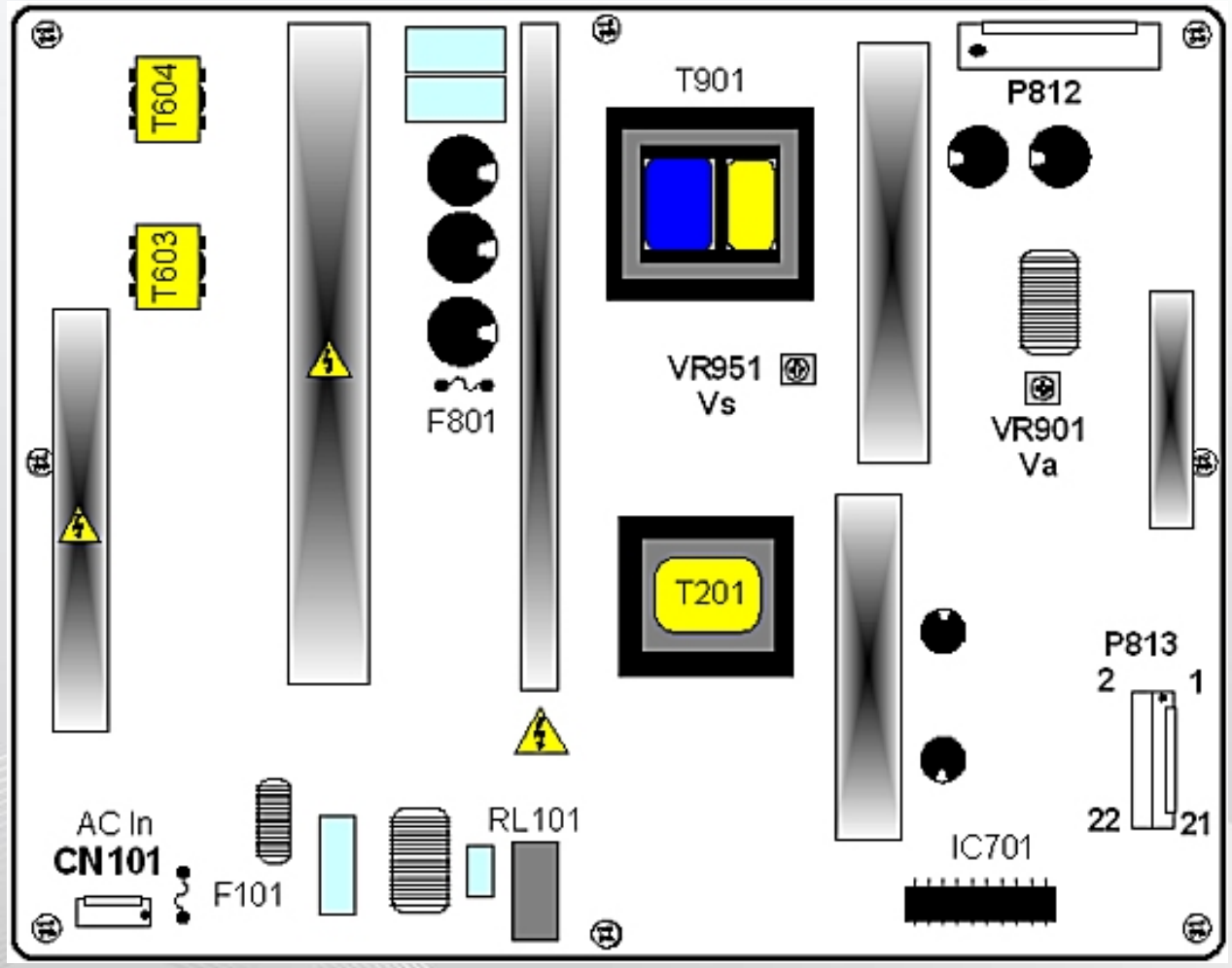
SMPS P/N EAY43533901

Check the sticker on the upper left side to confirm origin of the Panel or the White Label on the Power Supply itself to identify the PWB P/N.

We will examine the Operation of the EAY43533901.

Power Supply PWB Layout

Hot Ground Symbol represents a SHOCK Hazard



P812

1	Vs
2	Vs
3	n/c
4	GND
5	GND
6	Va
7	Va
8	GND
9	M5V
10	M5V

P813

16.5V	2	1	16.5V
Gnd	4	3	Gnd
0V	6	5	0V
Gnd	8	7	Gnd
5V	10	9	5V
5V	12	11	5V
Gnd	14	13	Gnd
Gnd	16	15	Gnd
AC Det	18	17	5_V Det
VS_ON	20	19	RL_ON
Gnd	22	21	M5V_ON

Switch Mode Power Supply Overview

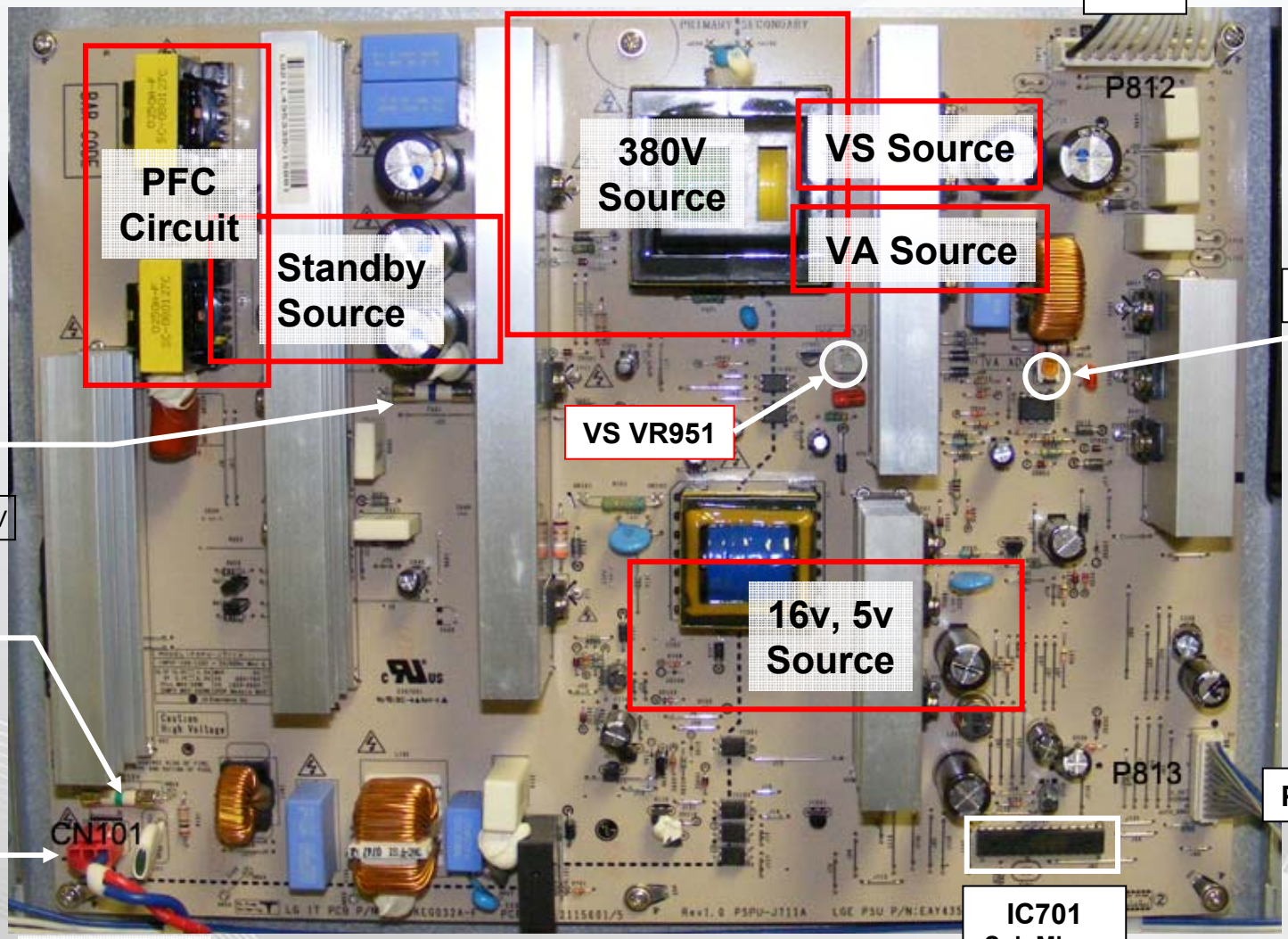
The Switch Mode Power Supply Board Outputs to the :

Y-SUS Board	**VS**	**Drives the Display Panel Horizontal Grid**
	VA	**Primarily responsible for Display Panel Vertical Grid**
	M5V VCC	**Used to develop Bias Voltages on the Y-SUS, X Drive, and Control Boards**
Main Board	**16V**	**Audio B+ Supply**
	5V	**Signal Processing Circuits**

There are 2 adjustments located on the Power Supply Board VA and VS. The 5V VCC is pre-adjusted and fixed. All adjustments are made with relation to Chassis Ground. Use "Full White Raster" 100 IRE

Adjustments	**VA**	**RV901**
	VS	**RV951**

Switch Mode Power Supply Circuit Layout



Power Supply Operation and Troubleshooting

AC Voltage is supplied to the SMPS Board at Connector CN101 from the AC Input Filter. Standby 5V is developed from 340V source supply (which during standby measures 159V hot ground). This supply is also used to generate all other voltages on the SMPS.

The 5V (standby) voltage is routed to the Sub Micon circuit (IC701) on the SMPS and through P813 to the Main PWB for Micon (IC100) operation. LD703 will glow green to indicate STBY 5V has arrived.
AC detect Pin 18, P813 is generated on the SMPS by monitoring the AC input and rectifying a small sample voltage. This AC Detect Voltage is routed to (IC701) the Sub Micon on the SMPS and the Micon (IC100) located on the Main Board and is used as a basic “SMPS OK” signal.

When the Micon (IC100) on the Main Board receives an “ ON “ Command from either the Keyboard or the Remote IR Signal it outputs a high to RL-ON. This signal first turns on a DC level shifter Q706 which creates 5V General. LD703 now glows amber indicating 5V General has been generated. This 5V General now provides the pull up voltages when supply the output circuits to the SMPS. The RL-ON enters the SMPS Board at Pin 19 of P813. The RL-ON Voltage is sensed by the Sub Micon (IC701) circuit which causes the Relay Drive Circuit to close Relay RL101 bringing the PFC source up to full power by increasing the 159V standby to 340V. At this time the 16V source becomes active and sent to the Main Board via P813.

The next step is for the Micon (IC105) on the Main Board to output a high on M5V_ON Line to the SMPS at P813 Pin 21 which is sensed by the Sub Micon IC (IC701) on the SMPS turning on the 5V VCC line.

The last step to bring the supply to “Full Power” occurs when the Micon (IC100) on the Main Board brings the VS-ON line high at Pin 20 of P813 on the SMPS Board which when sensed by the Sub Micon IC (IC701) turns on the VA and VS Supplies (VA is brought high before VS).

Power Supply Generic Troubleshooting Tips

Remember if a voltage is missing check for proper resistance before proceeding

Understanding the Power On Sequence when Troubleshooting a possible Power Supply Failure will simplify the process of isolating which circuit board failed to operate properly. In this Section we will investigate the Power on Sequence and examine ways to locate quickly where the failure occurred.

Check the Power On LED for Operation. A Red LED indicates a presence of 5V STB and AC-ON/DETECT. Failure of the Power ON LED to light is an indication of loss of 5V STB or AC ON/ Detect remember the 5V STB and AC-ON/DETECT are developed on the SMPS and sent to the Main Board. Check LD703 for Green glow.

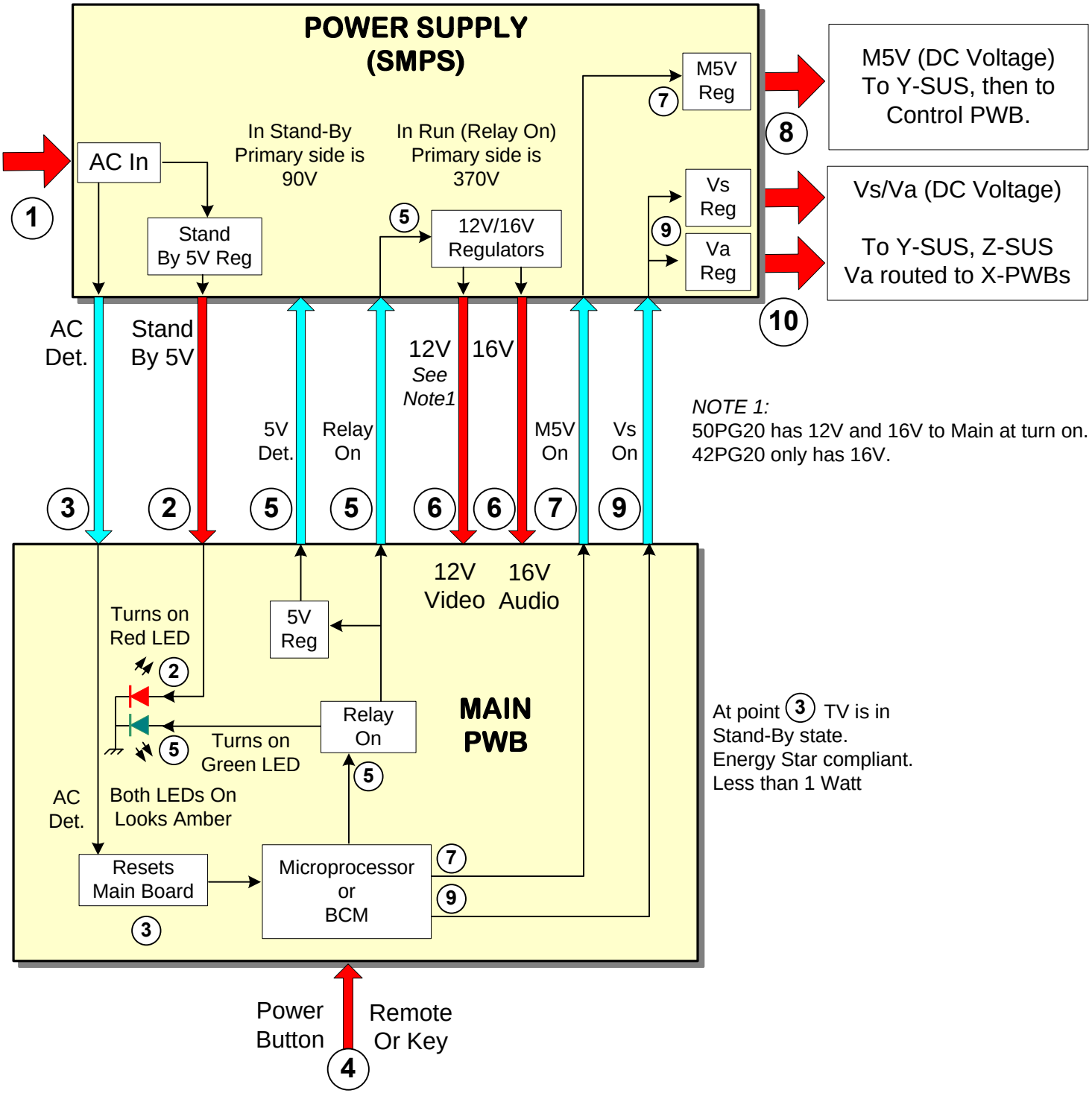
When Power is pressed, look for LD703 to change to Amber. Listen for Relay Click, the click of the Relay is an indication of RL-ON going high. RL-ON is sent from the Main Board to the SMPS and when present the IC701 controls the Relay Operation. RL-ON going High and no Relay is a failure of the SMPS, RL-ON staying low is a failure of the Main Board.

Relay Operation means that the SMPS if working properly will output the 16V Supply to the Main Board. This voltage will allow the Tuner, Audio and Video Circuits on the Main Board to function, and if connected to an Antenna Input, Audio would be present. If the Relays closed and these supplies failed suspect a problem with the SMPS.

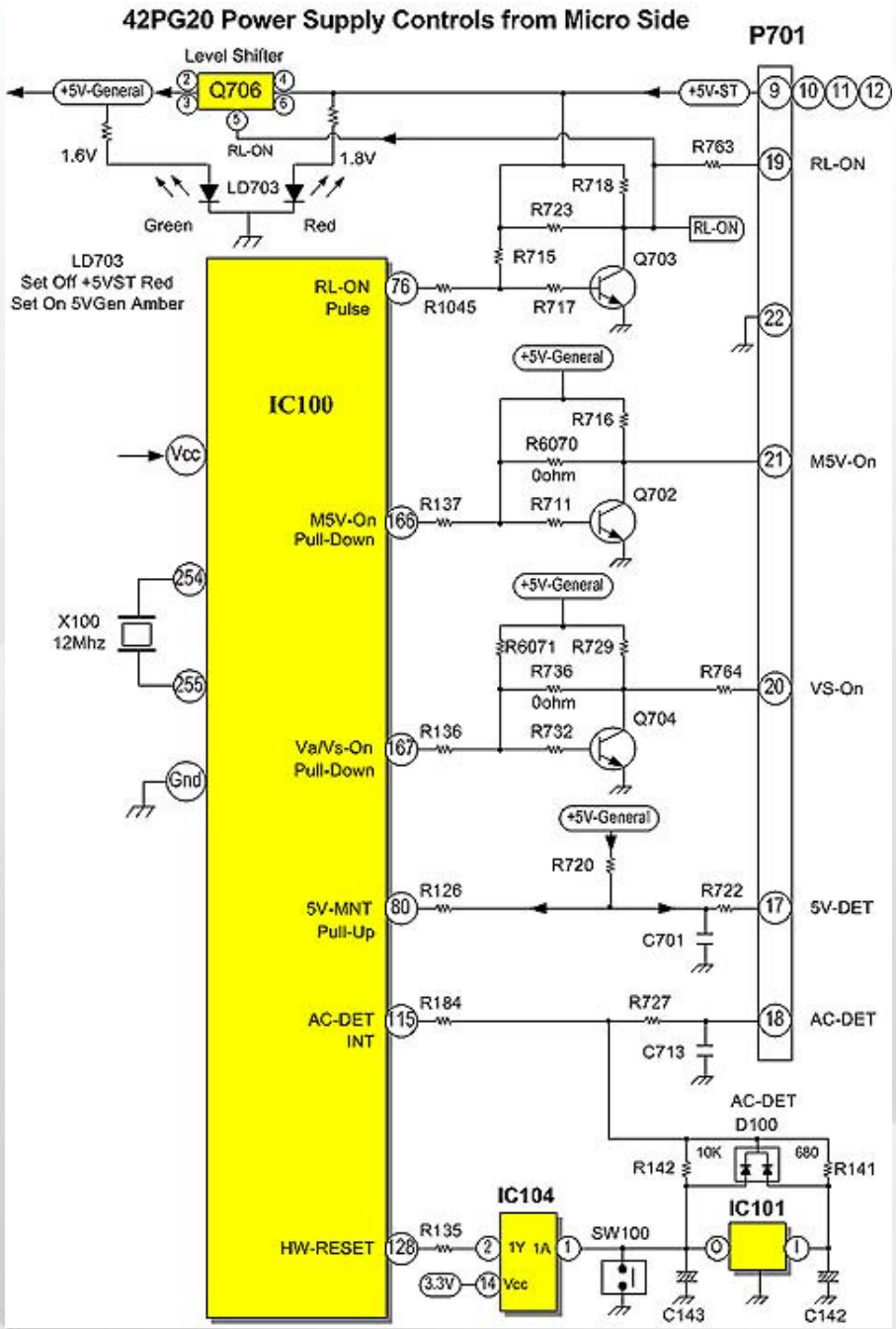
The next step of operation calls for the M5V_ON line from the Main Board to the SMPS to go high on P813 pin 21. A high on the M5V_ON Line activates the 5V VCC line. Loss of 5V VCC results in no “Raster”, no Display Panel Reset, no Y, Z, Control or X Board operation. Loss of 5V VCC and M5V_ON going high could be caused by any of these boards or failure of the SMPS. M5V_ON staying low indicates a problem on the Main Board.

VS-ON is the last step of the Power Sequence and is responsible for bringing the VS and VA Voltages up. The VS-ON signal pin 20 P813 is sent from the Main Board to the SMPS as a high, VS and VA and full operation of the Display Panel are now enabled. Loss of VS-ON results in loss of VA and VS and no Raster, no Panel Display Reset but Audio would be present. If VS-ON went high and VS and VA where missing the problem could be caused by a failure on the SMPS or a circuit using these voltages. A Resistance check should narrow the possible failures quickly.

50PG20/42PG20 POWER SUPPLY
TURN ON COMMANDS FROM MAIN PWB

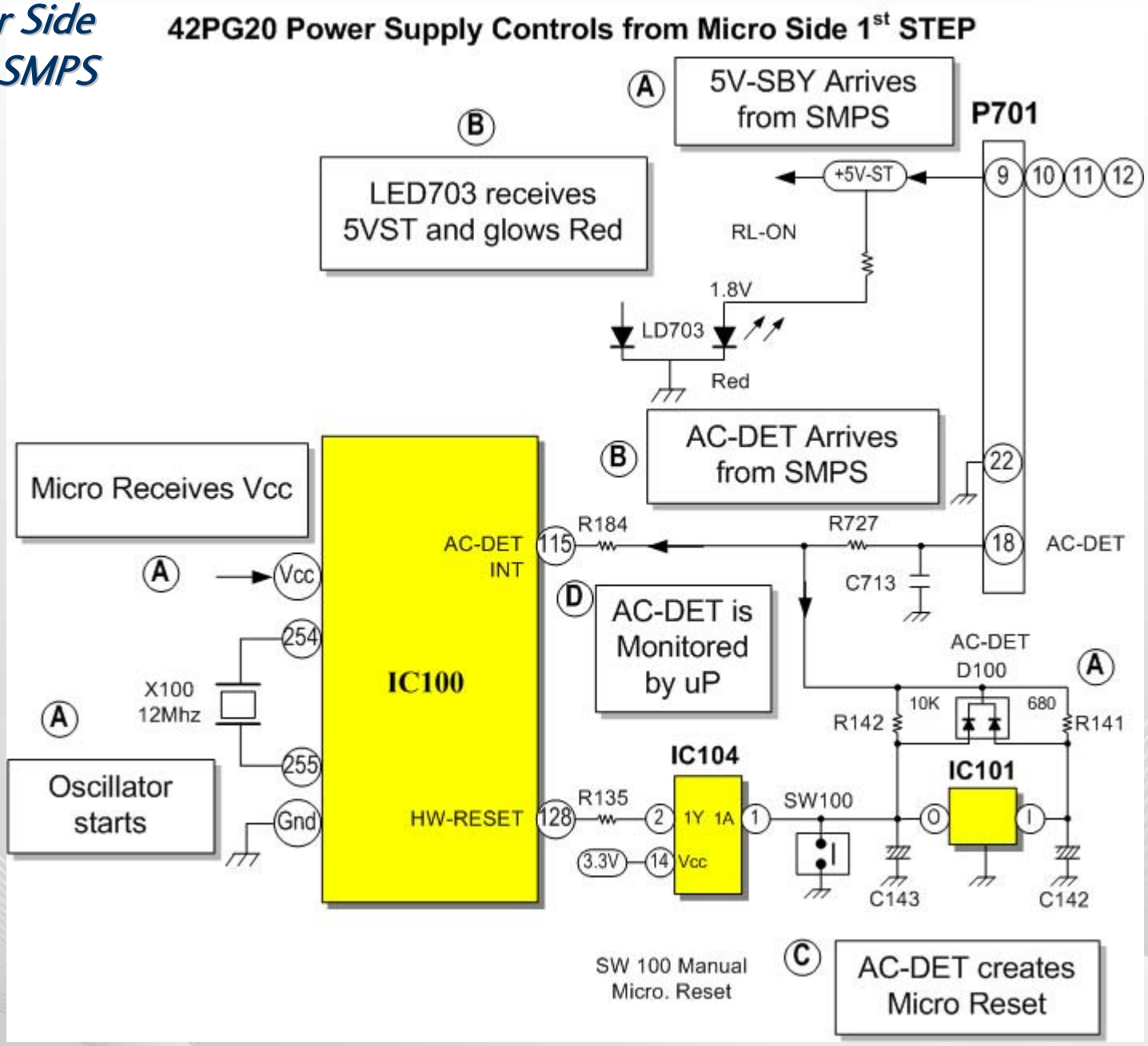


Microprocessor Side Control of the Switch Mode Power Supply

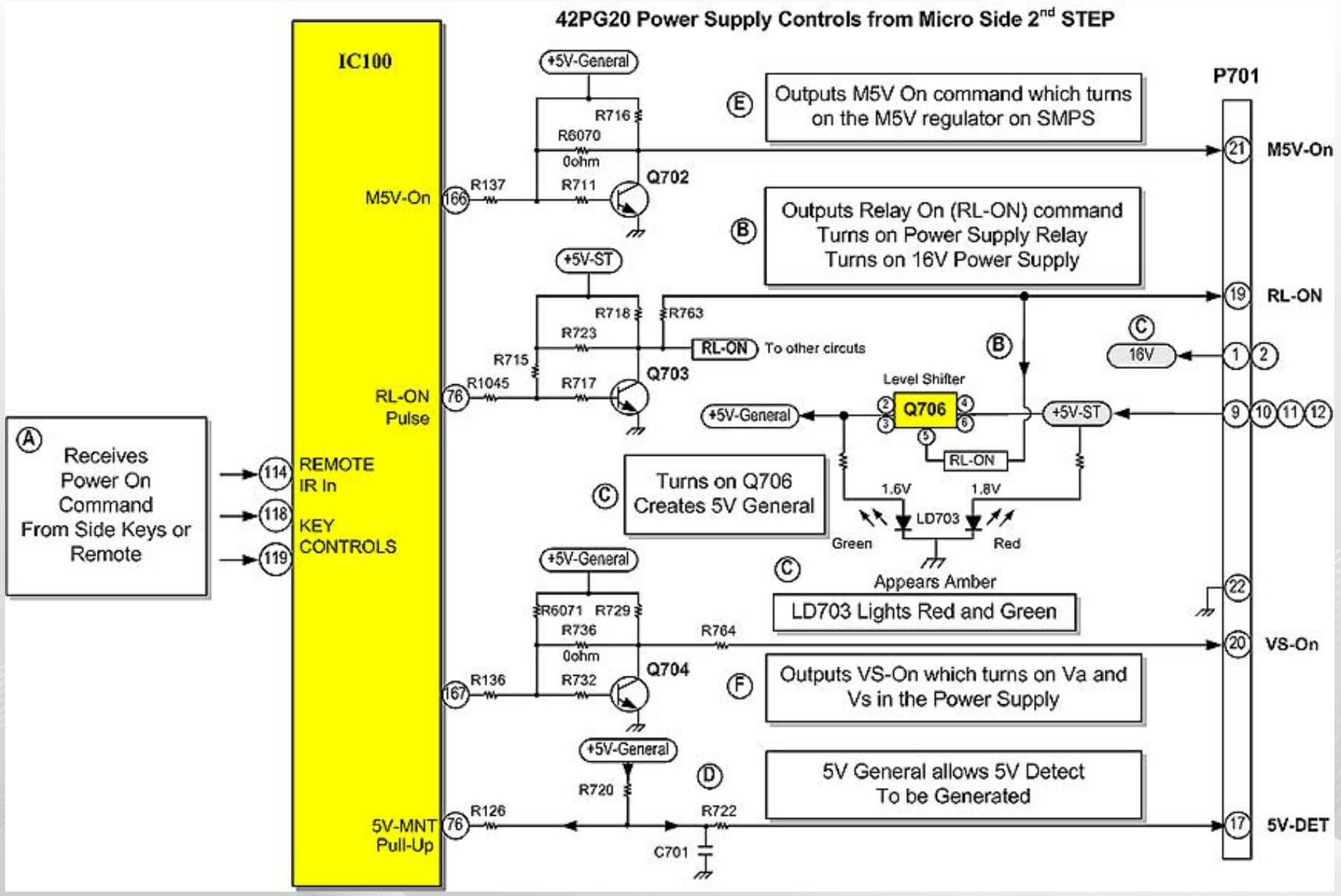


See next Slides
Closer View

Microprocessor Side Control of the SMPS Step 1



Microprocessor Side Control of the SMPS Step 2



Switch Mode Power Supply Static Test

This test can confirm the proper operation of the SMPS without the need to exchange the board. This Power Supply can operate in a No Load State. This means that by applying AC power to CN101 and all other plugs disconnected, this power supply will function.
Simply removing P813 (Lower Right Hand Side of the PWB), will cause the "AUTO" Pin 22 to go high from its normal low state allowing the Power Supply to go to full power on mode when AC Power is Supplied. *Be careful after this test and make sure the VA and VS lines have discharged before reconnecting the supply cables.*

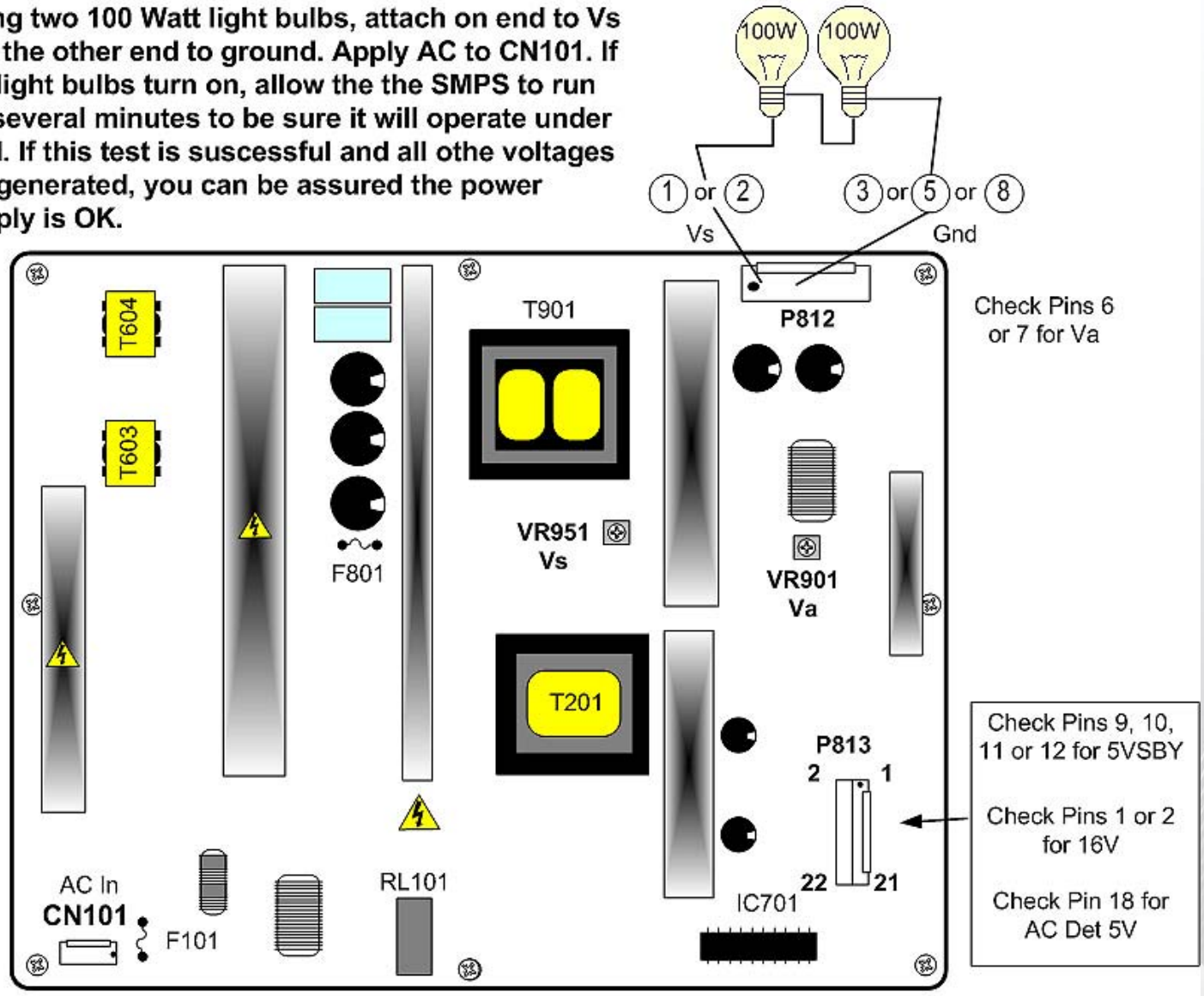
If either Y-SUS or Z-SUS is causing the power supply to shutdown, unplug the Z-SUS. *(Remember, Vs is routed to the small vertical Z-SUS PWB [P1 pin 11] for the output FETs.)* This will allow the Y-SUS to function. Also, if you unplug the Y-SUS from the SMPS and jump the 5V VCC line to any 5V location on the Control Board the Control PWB will function.

If the Y-SUS, Z-SUS and X PWBs are working normal, when the SMPS comes up to full power on, "Display Panel Reset" will be visible. Shorting the Auto Pattern Gen. test points at this time should result with test patterns on the screen.

For a "Stand-Alone" static test for the Power Supply, apply the usual 2 100Watt light Bulbs test on the Vs output line for a simulated load. If the Power Supply operates in this condition, it is assured it can maintain its output power under load.

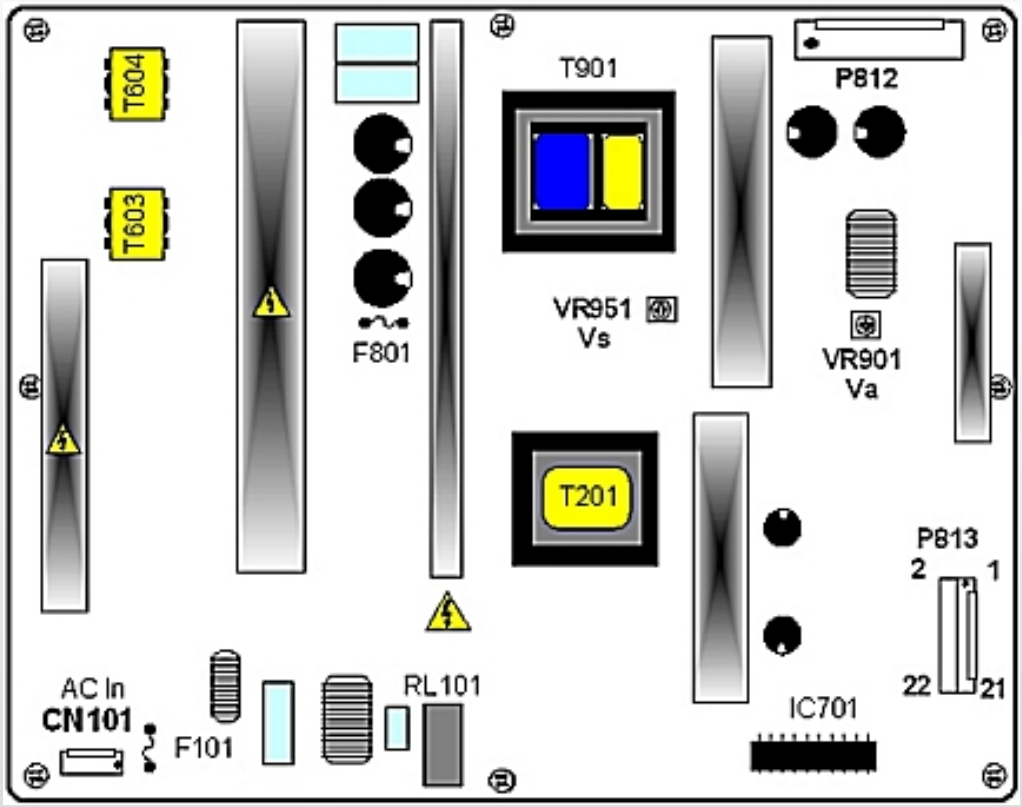
STATIC TEST UNDER LOAD LIGHT BULB TEST

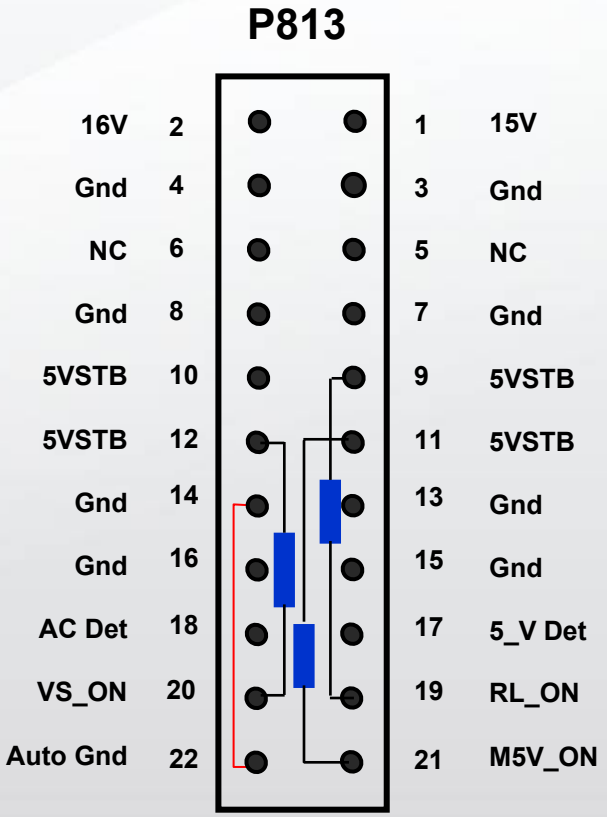
Using two 100 Watt light bulbs, attach on end to Vs and the other end to ground. Apply AC to CN101. If the light bulbs turn on, allow the the SMPS to run for several minutes to be sure it will operate under load. If this test is sucessful and all othe voltages are generated, you can be assured the power supply is OK.



Note: The light bulb test is not necessary for the SMPS to turn on and stay on. This SMPS will run without a load. But it is necessary to test the SMPS under a load.

Switch Mode Power Supply Static Test (Forcing on the SMPS in stages)





Ground the Auto Ground (Pin 22) on P813

Remove AC between each test step

AC Power Applied AC Det (Pin 18) and 5V STB (Pins 9 ~ 12) are 5V.

100Ω ¼ watt resistor added from 5V STB (Pins 9 ~ 12) to RL ON (Pin 19) closes relay RL101 turning on the 16V Supply

100Ω ¼ watt resistor added from 5V STB (Pins 9 ~ 12) to M5V_ ON (Pin 21) brings the 5V VCC line high

100Ω ¼ watt resistor added from 5V STB (Pins 9 ~ 12) to VS _ON (Pin 20) brings the VA and VS Lines high

Va and Vs Adjustments

Panel Voltage Label

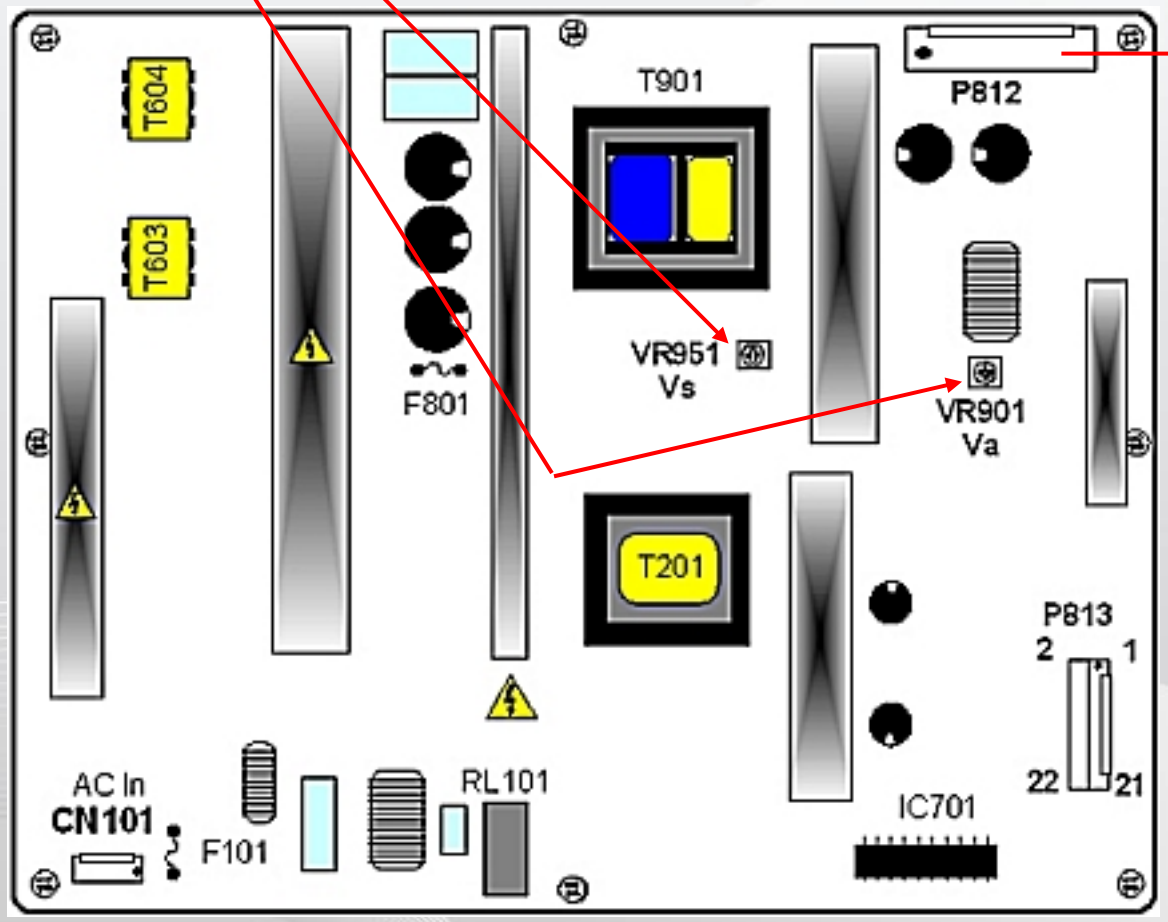
Model : PDP42G1####
801K542G1008000.AKAZBED

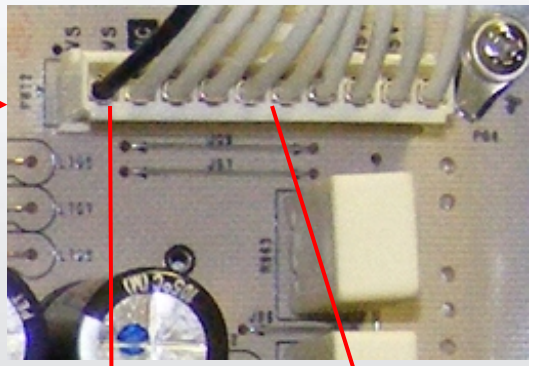
Voltage Setting:DC 5V Va:65V/ Vs:195V
NA / -190 / 140 / NA / 103

This Power Supply will come up and run with "NO" load. P812 pulled.

Pull P813 Apply AC Power Power Supply Starts.

Y-Z SUS Runs "Yes" Both Y and Z waveforms Generated "Yes"





Vs TP P812 Pin 1 or 2

Va TP P812 Pin 5 or 6

Use Full White Raster

CN101 and P812 Pin ID and Voltages

Voltage and Resistance Measurements for the SMPS.
All voltages from a working unit. All resistance from disconnected PWB.

Connector	Pin Number	Standby	Run	Resistance
CN101	1 and 3	120VAC	120VAC	480K

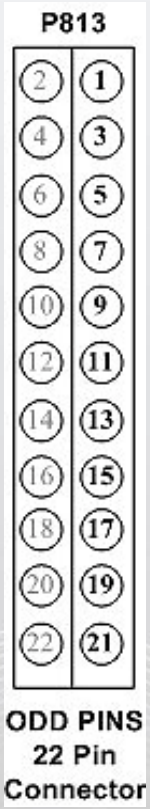
P812 CONNECTOR "Power Supply PWB“ to Y-SUS

Pin	Label	STBY	Run	Diode Mode
1	Vs	0V	*195V	Open
2	Vs	0V	*195V	Open
3	Gnd	0V	0V	Gnd
4	n/c	n/c	n/c	n/c
5	Gnd	0V	0V	Gnd
6	Va	0V	*65V	Open
7	Va	0V	*65V	Open
8	Gnd	0V	0V	Gnd
9	M5V	0V	5V	1.47V
10	M5V	0V	5V	1.37V

*** Note: This voltage will vary in accordance with Panel Label**

P803 Odd Pins ID and Voltages

Voltage and Resistance Measurements for the SMPS (Page 1 of 2)



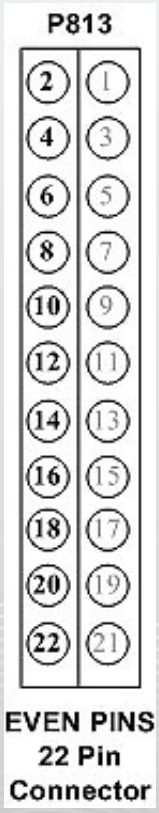
P813 CONNECTOR Odd "SMPS" to P701 "Main PWB"

Pin	Label	STBY	Run	No Load	Diode Mode
1	15V	0V	16.5V	16.5V	1.5V
3	Gnd	Gnd	Gnd	Gnd	Gnd
5	NC	NC	NC	NC	Open
7	Gnd	Gnd	Gnd	Gnd	Gnd
9	5V	5V	5V	5V	1.43V
11	5V	5V	5V	5V	1.43V
13	Gnd	Gnd	Gnd	Gnd	Gnd
15	Gnd	Gnd	Gnd	Gnd	Gnd
17	5_V Det	.15V	5V	5V	1.92V
19	RL_On	0V	3.73V	0V	Open
21	M5V_ON	0V	3.24V	0V	Open

Resistance Readings with the PCB Disconnected

P803 Even Pins ID and Voltages

Voltage and Resistance Measurements for the SMPS (Page 2 of 2)



P813 CONNECTOR Even "SMPS" to P701 "Main PWB"

Pin	Label	STBY	Run	No Load	Diode Mode
2	15V	0V	16.5V	16.5V	1.5V
4	Gnd	Gnd	Gnd	Gnd	Gnd
6	NC	NC	NC	NC	Open
8	Gnd	Gnd	Gnd	Gnd	Gnd
10	5V	5V	5V	5V	1.43V
12	5V	5V	5V	5V	1.43V
14	Gnd	Gnd	Gnd	Gnd	Gnd
16	Gnd	Gnd	Gnd	Gnd	Gnd
18	AC Det	5V	5V	5V	2.3V
20	Vs_On	0V	3.2V	0V	Open
22	AUTO	0V	0V	5V	Open

Resistance Readings with the PCB Disconnected

Using the Front Power LED for visual clues

(1) STBY 5V Short: Power LED does not light in stand by. No Power button function.

(2) Va or Vs Short: Power LED is lit Red in stand by. At Power On, goes to Blue. Relay closes. Power LED Blinks twice and 3rd blink stays blue. Relay opens. Power Supply outputs STBY 5V. 16V goes to 0V. 5Vcc drops to 1.7V. No Va or Vs. With Relay closed, 330V OK, then when relay opens, it drops to 155V.

(3) 16V Short: Power LED is lit Red in stand by. At Power On, Power LED cycles Red and Blue. Relay clicks rapidly on and off. STBY 5V line toggles with relay from 2.2V to 5V.

(4) 5Vcc Short: Power LED is lit Red in stand by. At Power On, goes to flashing Blue. 5Vcc line toggles rapidly between 0V to 0.7V.

Y-SUS PWB SECTION (Overview)

This Model "Combines" the Y and Z SUS Drive PWB together.

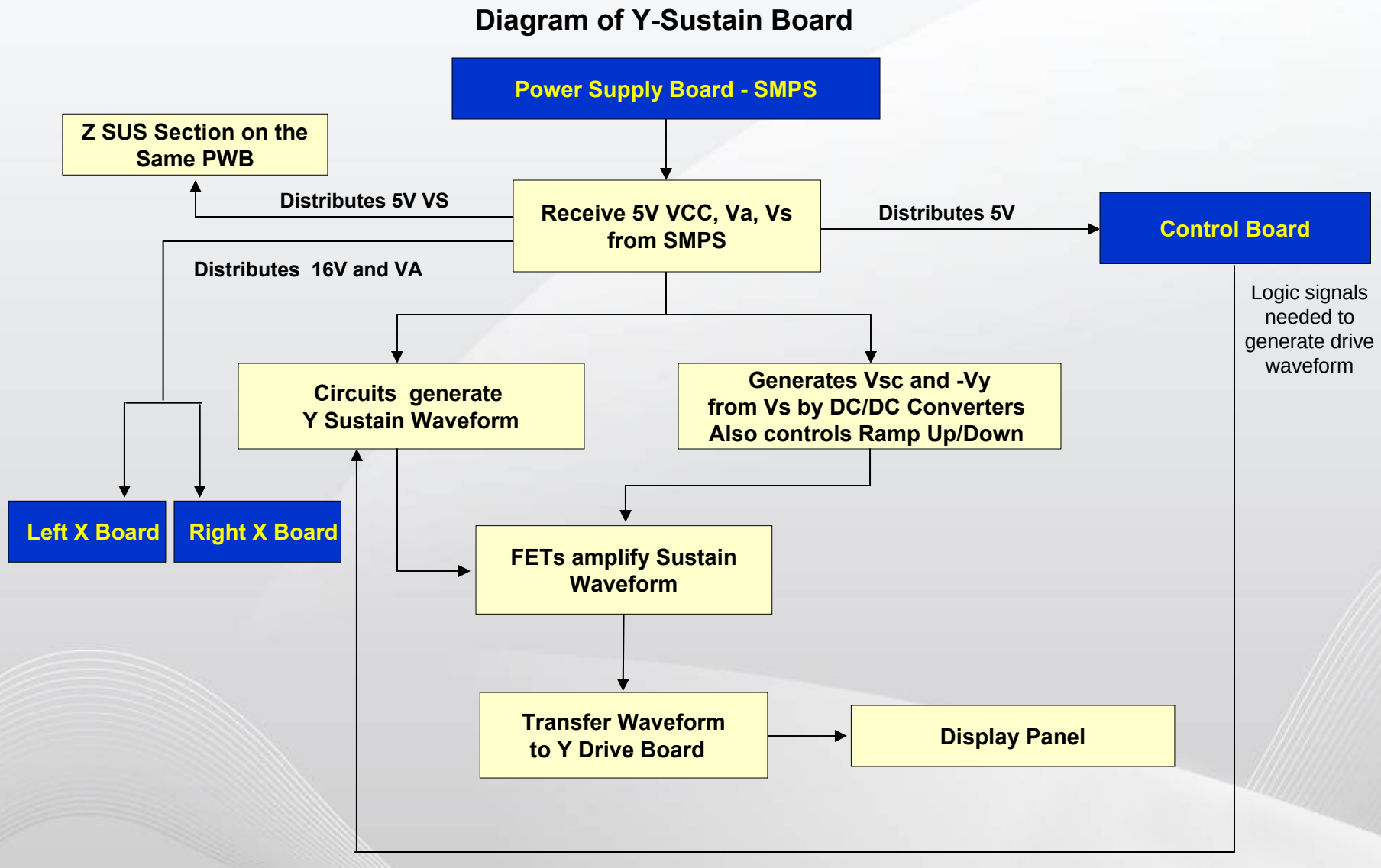
This Section of the Presentation will cover troubleshooting the Y-SUS Board for the Single Scan Plasma. Upon completion of the Section the technician will have a better understanding of the operation of the circuit and will be able to locate voltage and resistance test points needed for troubleshooting and alignments.

- Adjustments
- DC Voltage and Waveform Checks
- Resistance Measurements

Operating Voltages

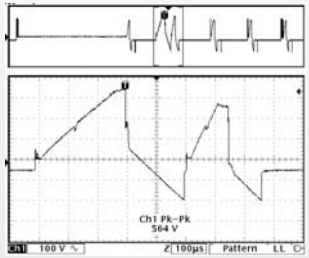
SMPS Supplied	VA	VA supplies the Panel Vertical Grid
	VS	VS Supplies the Panel Horizontal Grid
	VCC M5V	5V Supplies Bias to Y-Z SUS, Control via the Y-SUS
Y-Z SUS Developed	-VY	-VY Sets the Negative excursion of the Y SUS Drive Waveform
	V SET UP VR602	Ramp UP sets Pitch of the Top Ramp of the Drive Waveform
	V SET DN VR601	V Set Down sets the Pitch of the Bottom Ramp of the Drive Waveform
	VSC	VSC Set the amplitude of the complex waveform.
	16V	To the X-Drives PWB and the TCP IC's

Y SUS Block Diagram

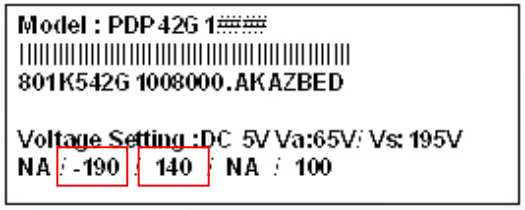


Y-SUS PWB Layout

Logic (Drive) Signals to the Y Drive PWBs



Use Y Drive Waveform TP



To Y-Drive P204

V SET DN VR 601

RAMP VR 602

FS202 (Vs) 4A 250V

VS and VA Input from the SMPS

P201

-VY TP R210

FS201 5A

To Y-Drive P200

Z Drive to Z Output PWB

P801

Z-Bias ADJ VR905

ZBias TP R946

VSC ADJ VR501

-VY ADJ VR502

VSC TP R211

P101

Logic Signals from the Control PWB

FS701 (Va) 10A

16V and Va to Left and Right X PWBs

P202

VSC and -VY Adjustments

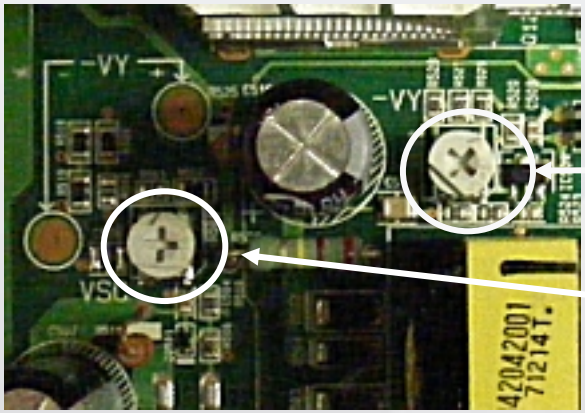
Heat Run, Vs, Va adjustments should have been completed.

Y SUSTAIN ADJUSTMENT DETAILS

Model : PDP42G1####
801K542G1008000.AKAZBED

Voltage Setting:DC 5V Va:65V/ Vs:195V
NA / -190 / 140 / NA / 100

-VY VSC

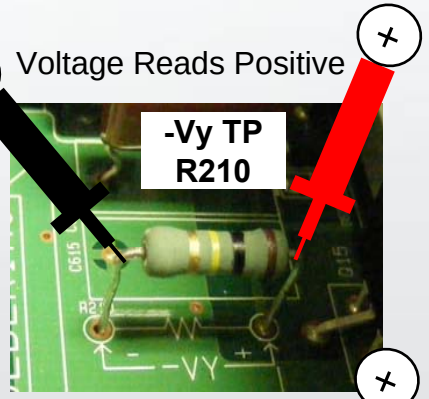


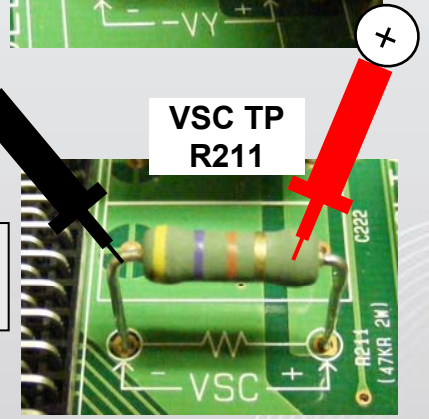
Lower Left Side Of PWB

VR502 — *-Vy TP* → *Middle Left Side of PWB*

VR501 — *Vsc TP* → *Lower Left Side of PWB*

Voltage Reads Positive





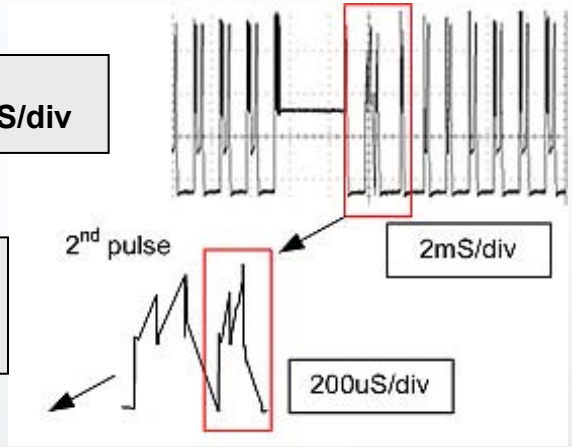
These are DC level Voltage Adjustments

Set should run for 15 minutes, this is the "Heat Run" mode.
Set screen to "White Wash" mode or 100 IRE White input.

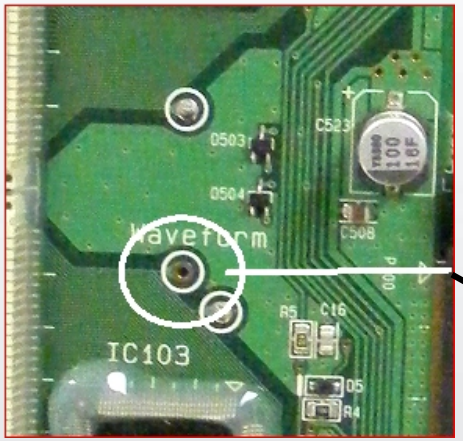
Adjust –Vy to 190V (+/- 1V)
Adjust VSC to 140 (+/- 1V)

Y-Drive (SCAN) Signal Overview

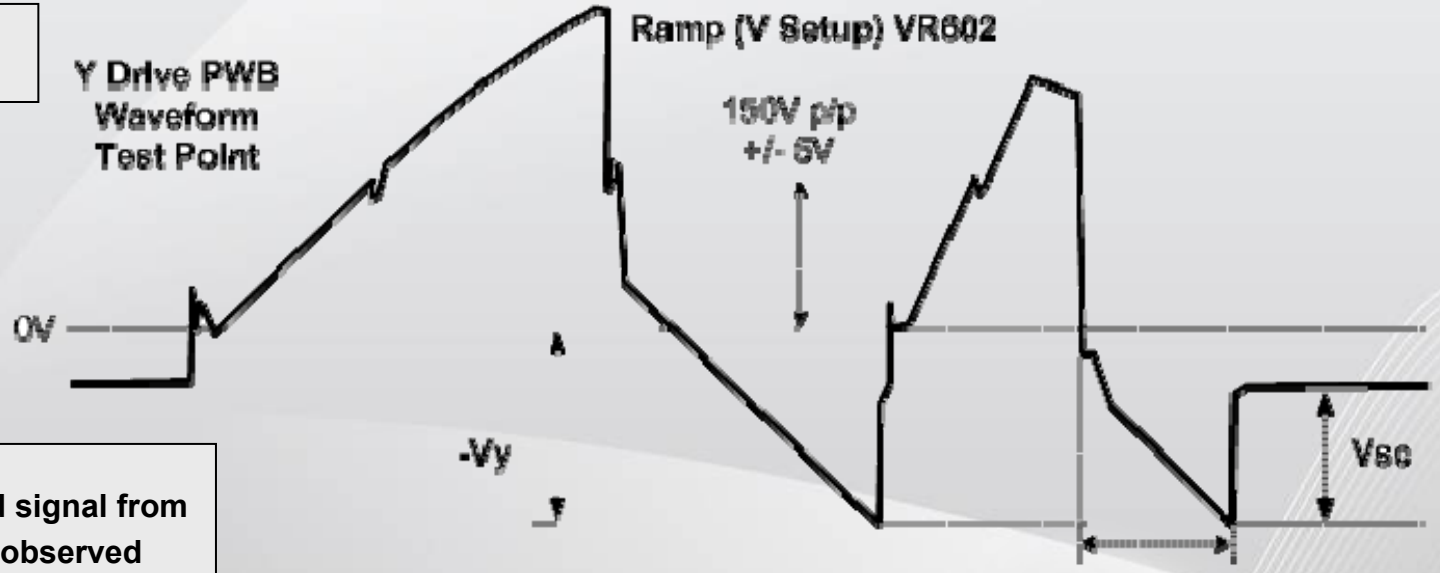
① Overall signal observed 2mS/div



② Highlighted signal from figure above observed 200uS/div



Y-Drive PWB Test Point



③ Highlighted signal from figure above observed 100uS/div

NOTE: If Vset DN too high, this set will go to excessive bright, then shutdown.
To correct, remove the LVDS from control PWB and make necessary adjustments.

Observing (Capturing) the Y-Drive Signal for Vsetup Ramp-Up (RAMP)

Fig 1 Top: As an example of how to lock in to the Y-Drive Waveform. Fig 1 top shows the signal locked in at 4ms per/div.
The signal for Vsetup is outlined within the Waveform

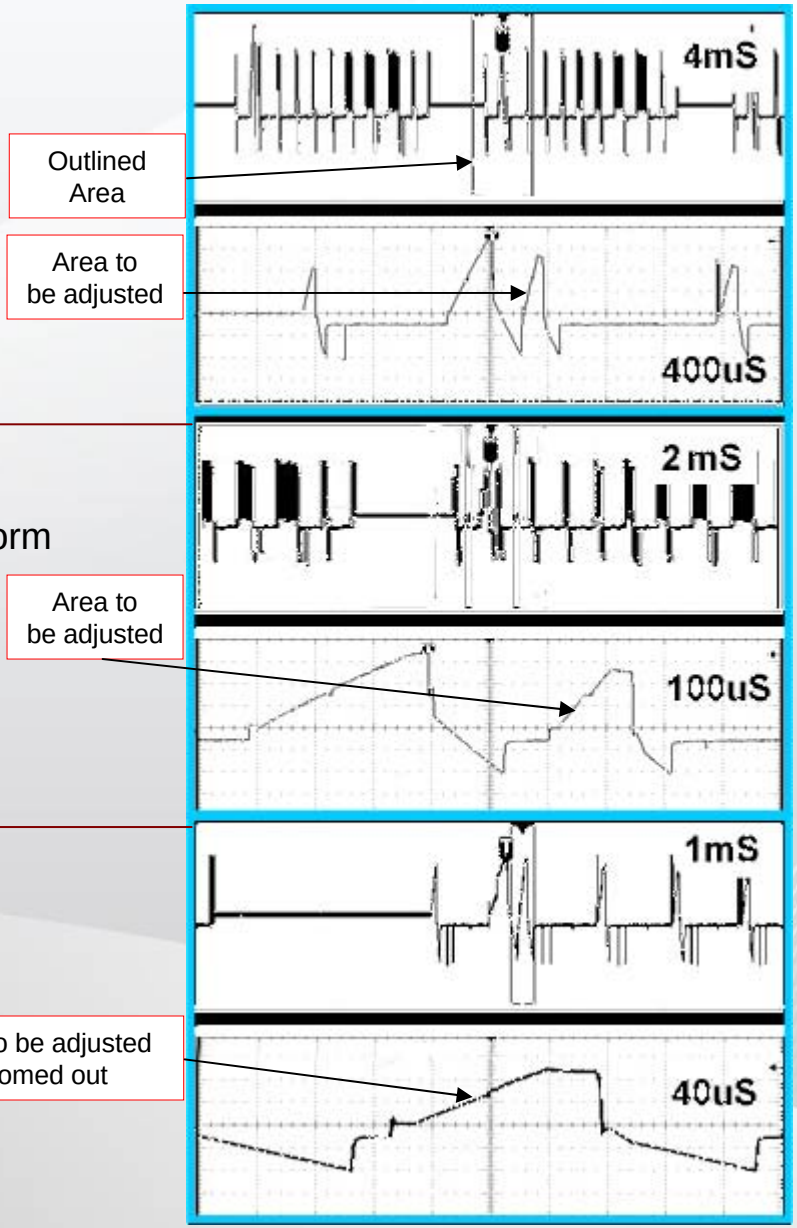
Fig 1 Lower: At 400uSec per/division, the waveform to use for Vsetup Is now isolated.

Fig 2 Top: At 2ms per/div. the signal for Vsetup is now easier to recognize. It is outlined within the Waveform

Fig 2 Lower: At 100uSec per/division, the waveform to use for Vsetup Is now isolated.

Fig 3 Top: At 1ms per/div. the signal for Vsetup is now clearly visible. It is outlined within the Waveform

Fig 3 Lower: At 40uSec per/division, the adjustment for Vsetup can be made.



Observing (Capturing) the Y-Drive Signal for Vsetdn (Ramp-Down)

Fig 1 Top: As an example of how to lock in to the Y-Drive Waveform. Figure 1 top shows the signal locked in at 4ms per/div.
The outlined signal for Vsetdn is outlined within the Waveform

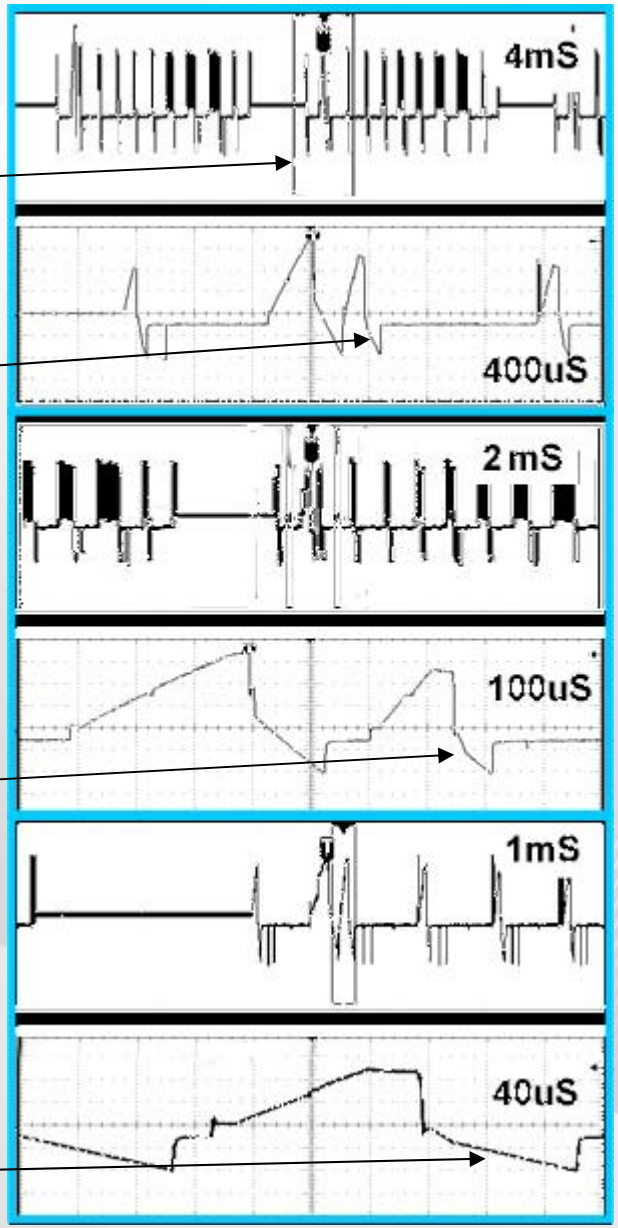
Fig 1 Lower: At 400uSec per/division, the waveform to use for Vsetdn Is now isolated.

Fig 1 Top: At 2ms per/div. the outlined signal for Vsetdn is now easier to recognize. It is outlined within the Waveform

Fig 1 Lower: At 100uSec per/division, the waveform to use for Vsetdn Is now isolated.

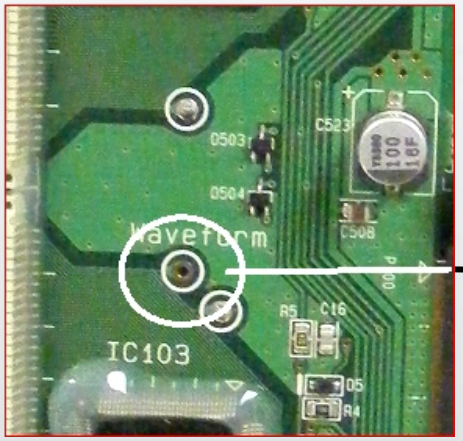
Fig 1 Top: At 1ms per/div. the outlined signal for Vsetdn is now clearly visible. It is outlined within the Waveform

Fig 1 Lower: At 40uSec per/division, the adjustment for Vsetdn can be made.

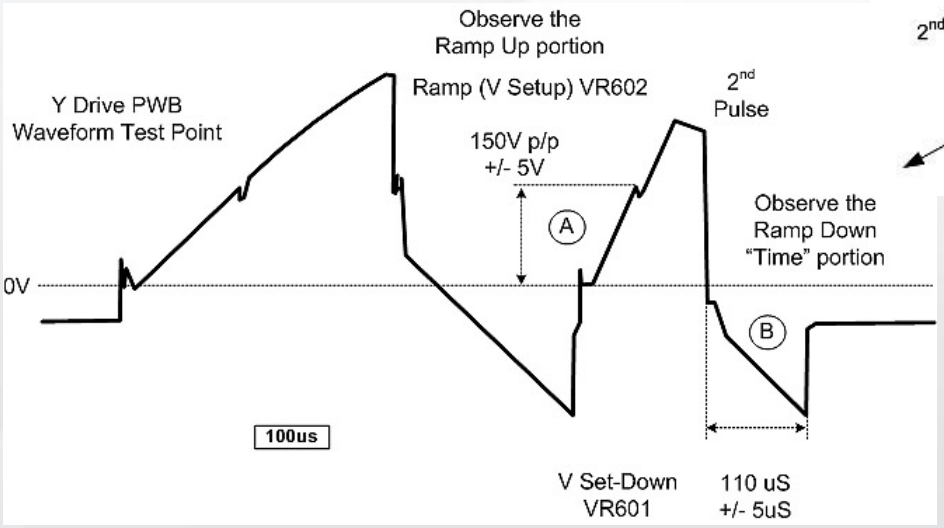


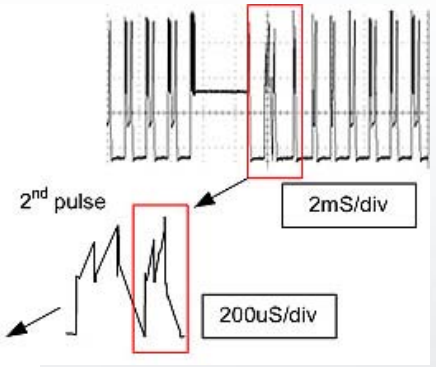
V-Set Up (RAMP) and V-Set Down Adjustments

Y SUSTAIN ADJUSTMENT DETAILS
(Vs, Va, VSC, VSC, -Vy and Z-Bias Must have already been completed).

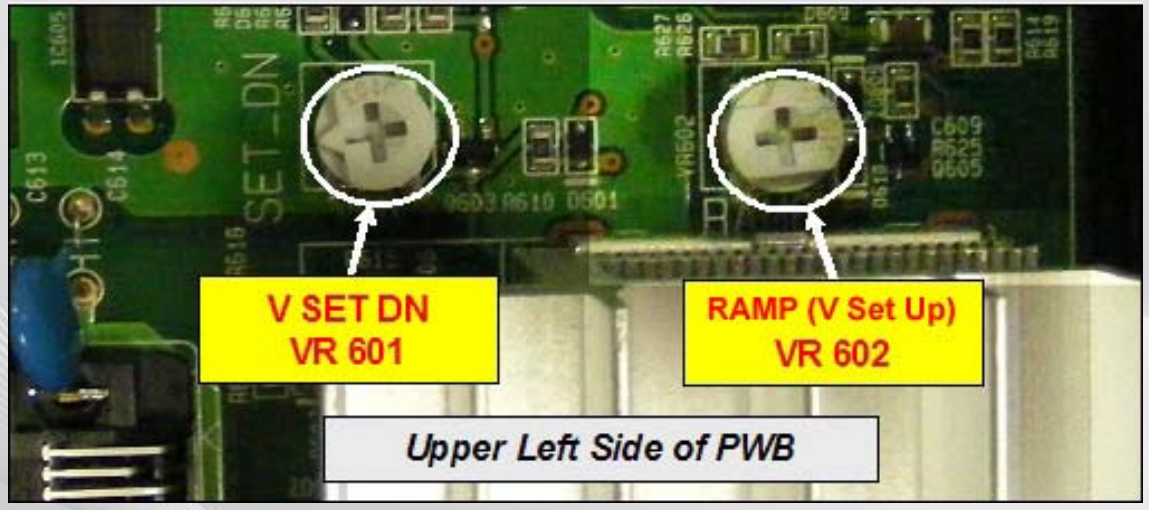


Y-Drive PWB Test Point



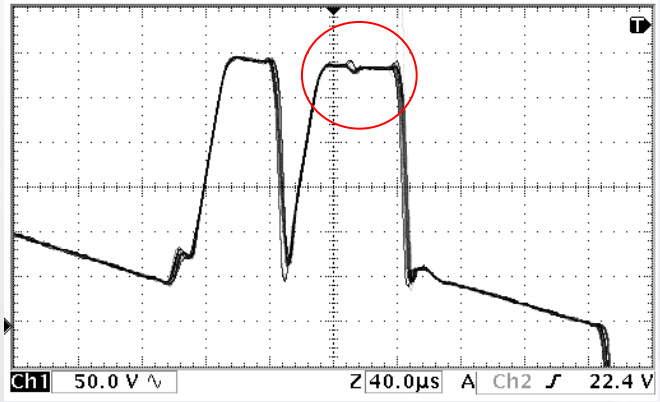


Observe the Picture while making these adjustments. Normally, they do not have to be done.

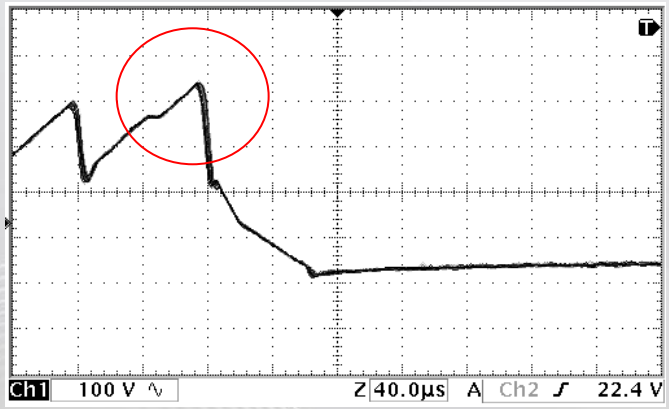


V Set Up Too High or Low

Vset UP swing is Minimum 150vP/P Max 220vP/P

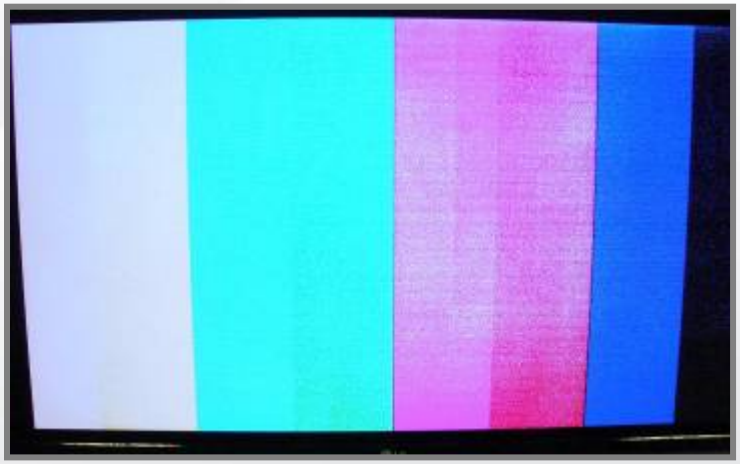


Ramp (Vset UP) too high

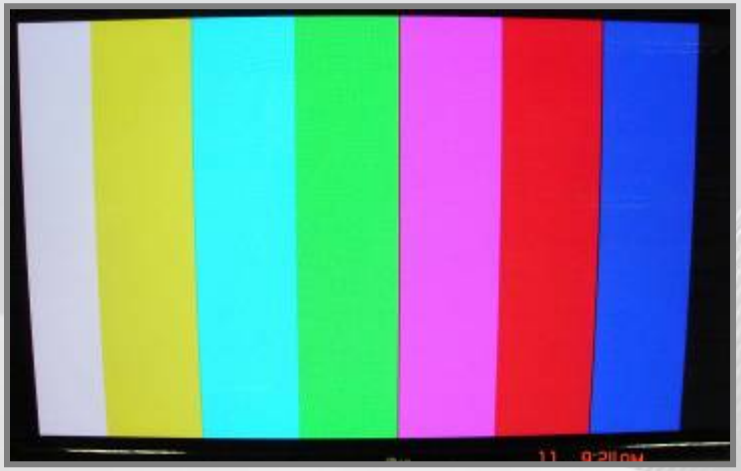


Ramp (Vset UP) too low

Panel Waveform Adjustment



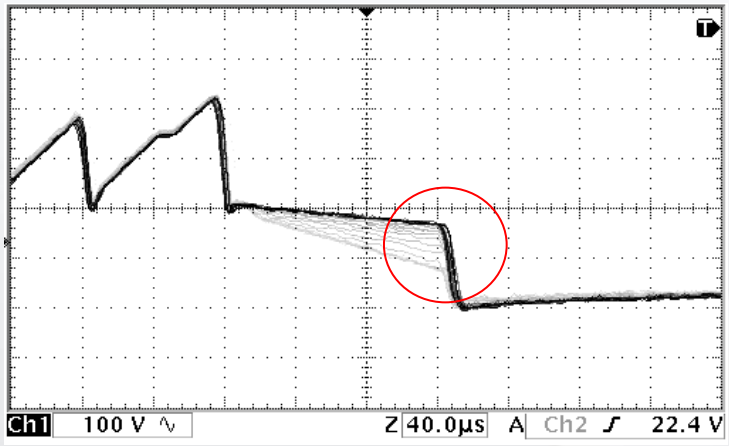
The center begins to wash out and arc due to **Vset UP** Peeking too late and alters the start of the **Vset DN** phase.



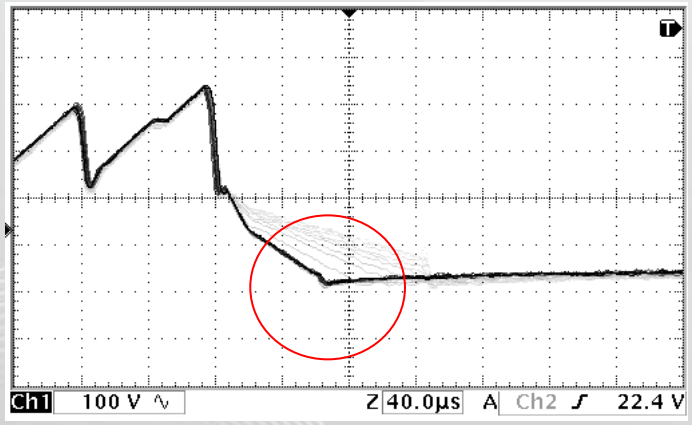
Very little alteration to the picture, the wave form indicates a distorted **Vset UP**. The peek widens due to the **Vset UP** peeking too quickly.

V Set Dn Too High or Low

Vset Dn swing is Minimum 60uS Max 123uS

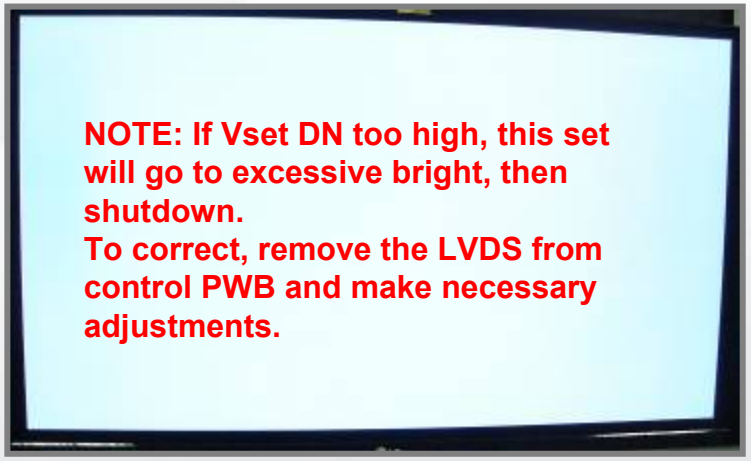


Vset DN too high

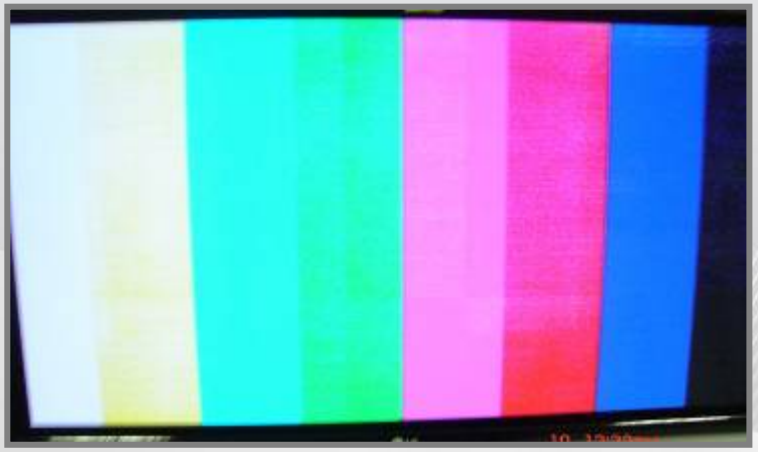


Vset DN too low

Panel Waveform Adjustment



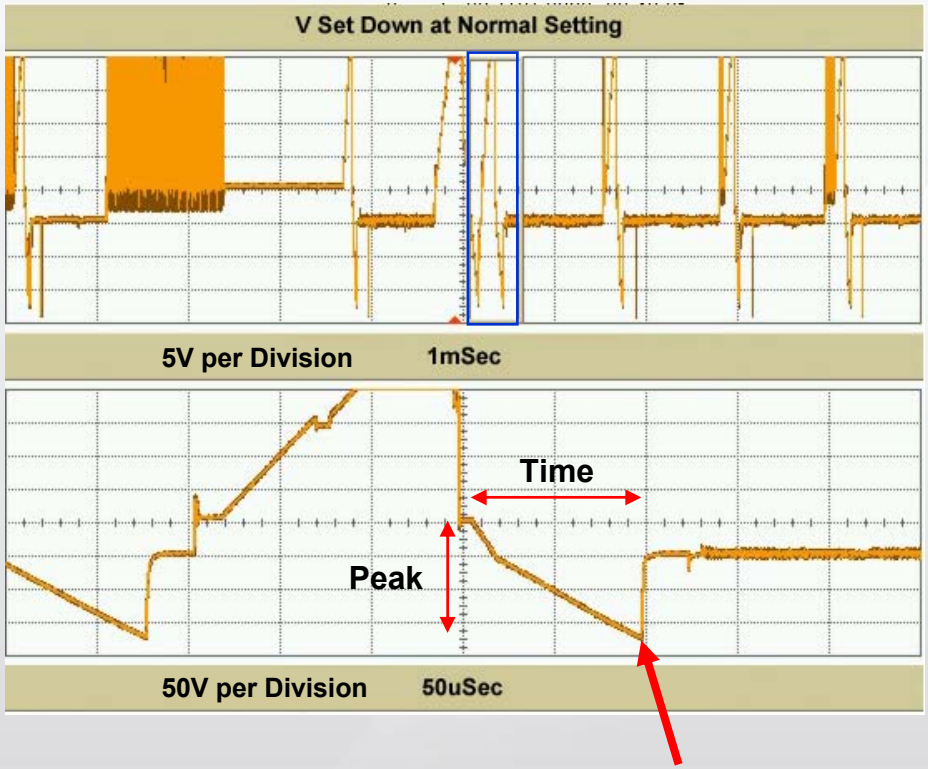
All of the center washes out due to increased **Vset_DN** time.



The center begins to wash out and arc due to decreased **Vset DN** time.

V Set Dn Too High Causing Shutdown

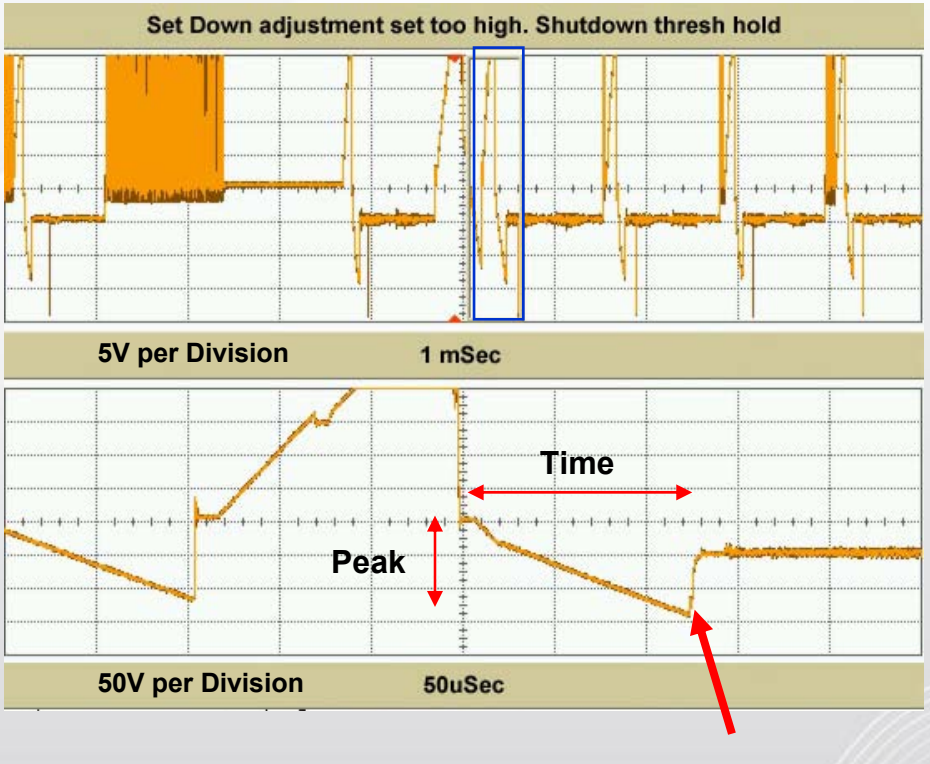
GOOD



The above image is the Set Down signal set for Normal operation at 110uSec

NOTE: If Vset DN too high, this set will go to excessive bright, then shutdown.
To correct, remove the LVDS from Control PWB and make necessary adjustments.

NO GOOD



The above image is the Set Down signal set to High (Approx. 120uSec) This is the Shutdown Threshold level. Any higher, the set will shut down.

Notice that the amplitude of the Set Down (Bottom portion) peak begins to decrease.

Y-SUS P201 to SMPS P812 Plug Information

Voltage and Resistance Measurement

P201 CONNECTOR "Y-SUS" to "Power Supply PWB" P812

Pin	Label	STBY	Run	Diode Mode
1	Vs	0V	*194V	Open
2	Vs	0V	*194V	Open
3	NC	NC	NC	NC
4	Gnd	0V	0V	Gnd
5	Gnd	0V	0V	Gnd
6	Va	0V	*65V	Open
7	Va	0V	*65V	Open
8	Gnd	0V	0V	Gnd
9	M5V	0V	5V	.83V
10	M5V	0V	5V	.83V

*** Note: This voltage will vary in accordance with Panel Label**

Resistance Readings with the PCB Disconnected using the Diode mode on the DVM

Y-SUS P202 to X Drive P211 and P311 Plug Information

SLIDE CORRECTED
HANDOUT MANUAL ERROR

Voltage and Resistance Measurements for the Y SUS Board

P202 CONNECTOR "Y-SUS PWB" to "X-Drive" Left P211 and Right P311

Pin	Label	STBY	Run	Diode Mode
1	Gnd	Gnd	Gnd	Gnd
2	Gnd	Gnd	Gnd	Gnd
3	15V	0V	15.8V	1V
4	ER2	0V	61.5V	Open
5	ER2	0V	61.5V	Open
6	Va	0V	64.9V	Open
7	Gnd	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd	Gnd
9	15V	0V	15.8V	1V
10	ER1	0V	61.5V	Open
11	ER1	0V	61.5V	Open
12	Va	0V	*64.9V	Open

*** Note: This voltage will vary in accordance with Panel Label**

Resistance Readings with the PCB Disconnected using the Diode mode on the DVM

Y-SUS P801 to Z Drive P1 Plug Information

Voltage and Resistance Measurements for the Y SUS Board

P801 Connector Y-SUS to Z Drive P1 Plug Information

Pin	Label	STBY	Run	Diode Mode
1	+Vs	0V	*194V	Open
2	Gnd	Gnd	Gnd	Gnd
3	ZSUS	0V	70.46V	Open
4	Gnd	Gnd	Gnd	Gnd
5	ZSUS	0V	70.46V	Open
6	Gnd	Gnd	Gnd	Gnd
7	ZSUS	0V	70.46V	Open
8	Gnd	Gnd	Gnd	Gnd
9	ZSUS	0V	70.46V	Open
10	Gnd	Gnd	Gnd	Gnd
11	ZSUS	0V	70.46V	Open

*** Note: This voltage will vary in accordance with Panel Label**

Resistance Readings with the PCB Disconnected using the Diode mode on the DVM

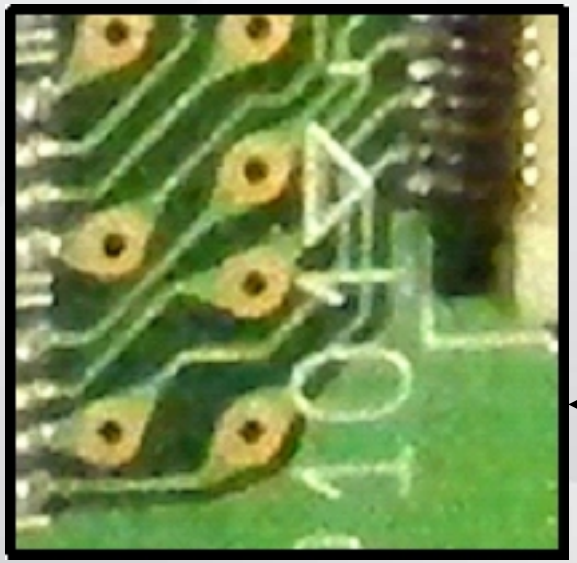
P101 Y-SUS to Control PWB P160 Plug Information

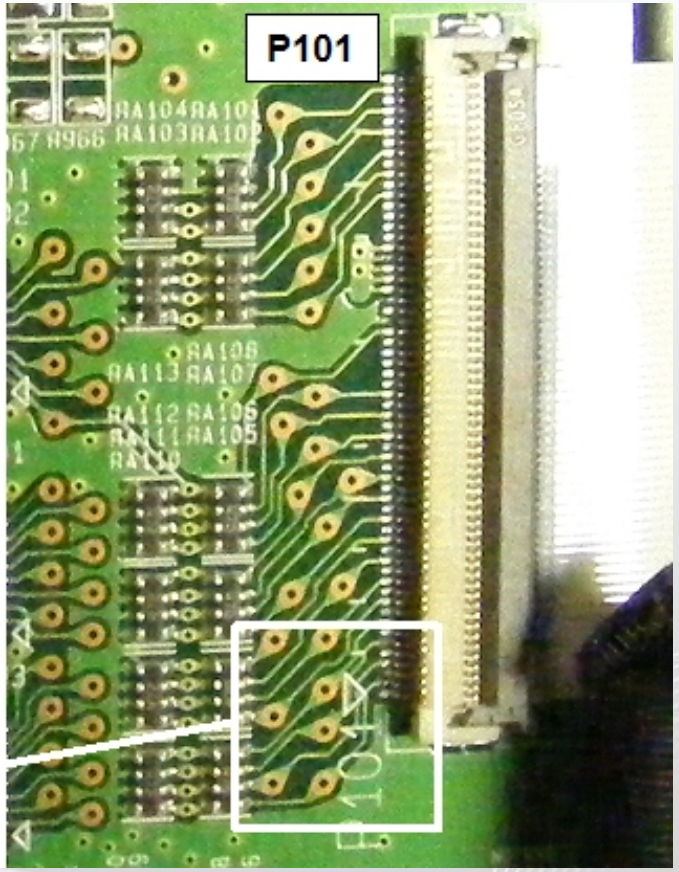
Voltage and Resistance Measurements for the Y SUS Board

These connector pins are too close to read without possible damage to the PWB

Actually a 60 Pin Connector "Only Labels for 1-19" on the Control PWB

Looking closely, these test points are “every other pin”. The bottom TP represents “19” label on the Control PWB.





Y-SUS P101 to Control P160 Plug Information

Pin 1 on Y-SUS is Pin 60 on Control

Resistance Readings with the PCB Disconnected using the Diode mode on the DVM

(All 5V Lines 17~21 Resistance readings are 1.7K)

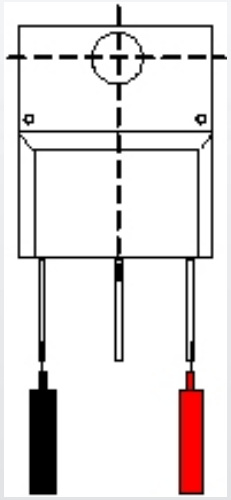
Pin	Label	STBY	Run	Diode Mode
1	Gnd	Gnd	Gnd	Gnd
2	CLK	0V	3.2V	2.87V
3	Gnd	Gnd	Gnd	Gnd
4	STB	0V	0.76V	2.87V
5	Gnd	Gnd	Gnd	Gnd
6	OSC1	0V	0V	2.87V
7	Gnd	Gnd	Gnd	Gnd
8	OSC2	0V	3V	2.87V
9	Gnd	Gnd	Gnd	Gnd
10	DATA	0V	0.6V	2.87V
11	Gnd	Gnd	Gnd	Gnd
12	SUS_DN	0V	0V	2.87V
13	Gnd	Gnd	Gnd	Gnd
14	SUS_UP	0V	2V	2.87V
15	Gnd	Gnd	Gnd	Gnd
16	ER_DN	0V	1.2V	2.87V
17	Gnd	Gnd	Gnd	Gnd
18	ER_UP	0V	2V	2.87V
19	Gnd	Gnd	Gnd	Gnd
20	SET_UP	0V	0.26V	2.87V

Pin	Label	STBY	Run	Diode Mode
21	Gnd	Gnd	Gnd	Gnd
22	Set_DN2	0V	0.2V	2.87V
23	Gnd	Gnd	Gnd	Gnd
24	PASS_TOP	0V	0.2V	2.87V
25	Gnd	Gnd	Gnd	Gnd
26	DELTA_Vy	0V	0.16V	2.87V
27	Gnd	Gnd	Gnd	Gnd
28	DET_LEVEL	0V	0V	2.87V
29	Gnd	Gnd	Gnd	Gnd
30	SLOPE_RETE	0V	0V	2.87V
31	Gnd	Gnd	Gnd	Gnd
32	SET_UP	0V	1.9V	2.87V
33	Gnd	Gnd	Gnd	Gnd
34	Set_DN_2	0V	1.4V	2.87V
35	Gnd	Gnd	Gnd	Gnd
36	X_ER	0V	2.9V	2.87V
37	Gnd	Gnd	Gnd	Gnd
38	Y-Enable	0V	0.6V	2.87V
39	n/c	n/c	n/c	n/c
40	5V	OV	4.75V	0.76V

Pin	Label	STBY	Run	Diode Mode
41	5V	OV	4.75V	0.76V
42	5V	OV	4.75V	0.76V
43	5V	OV	4.75V	0.76V
44	5V	OV	4.75V	0.76V
45	n/c	n/c	n/c	n/c
46	n/c	n/c	n/c	n/c
47	Z-ENABLE	0V	0V	1.25V
48	Gnd	Gnd	Gnd	Gnd
49	Z-BIAS	0V	1.71V	1.1V
50	Gnd	Gnd	Gnd	Gnd
51	VZB-SEL	0V	0V	1.1V
52	Gnd	Gnd	Gnd	Gnd
53	Z-ER_UP	0V	1.25V	1.1V
54	Gnd	Gnd	Gnd	Gnd
55	Z-ER_DN	0V	1.35V	1.1V
56	Gnd	Gnd	Gnd	Gnd
57	Z-SUS_UP	0V	0.35V	1.1V
58	Gnd	Gnd	Gnd	Gnd
59	Z-SUS_DN	0V	1.15V	1.1V
60	Gnd	Gnd	Gnd	Gnd

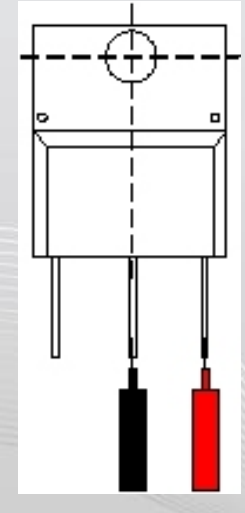
Y-SUS How to Check the Output FETs

Name is printed on the components.



30F122

Forward 0.5V ~ 0.7V
Reverse: OL

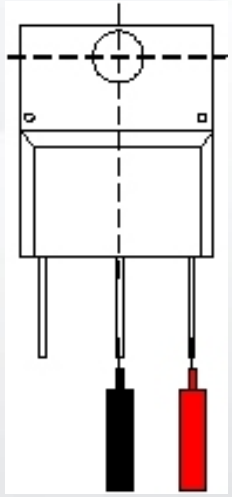


RF2001

Forward 0.3V ~ 0.5V
Reverse: OL

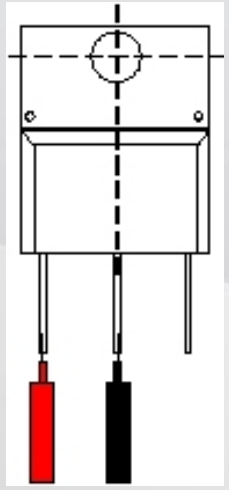
45F123

Forward 0.3V ~ 0.5V
Reverse: OL



30F122

Forward 0.4V ~ 0.5V
Reverse: OL



RF2001

Forward 0.3V ~ 0.5V
Reverse: OL

45F123

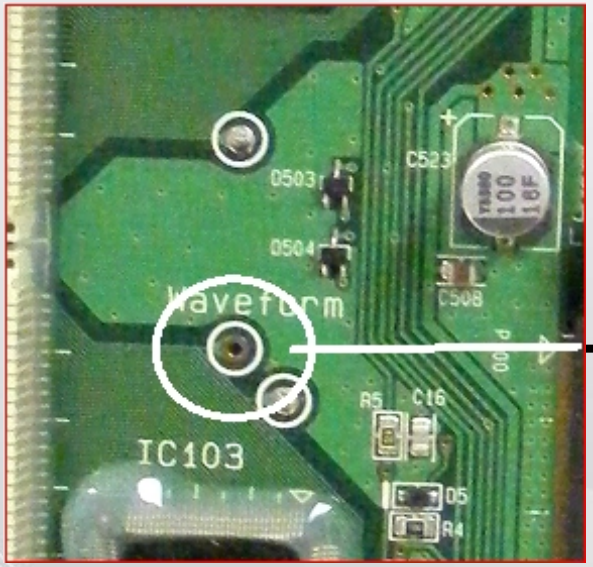
Forward 0.9V ~ 1.0V
Reverse: OL

Y Drive Board Explained

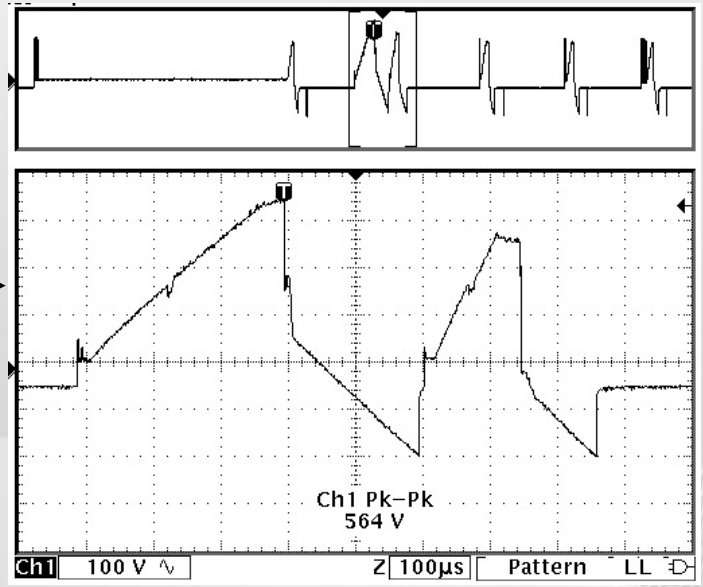
Y-Drive Board works as a path supplying the Sustain and Reset waveforms which are made in the Y SUSTAIN PWB and sent to the Panel through SCAN DRIVER IC's.

The Y Drive Boards supply a waveform which selects the horizontal electrodes sequentially.

* 42PG20 uses 8 DRIVER ICs on 1 Y Drive Board



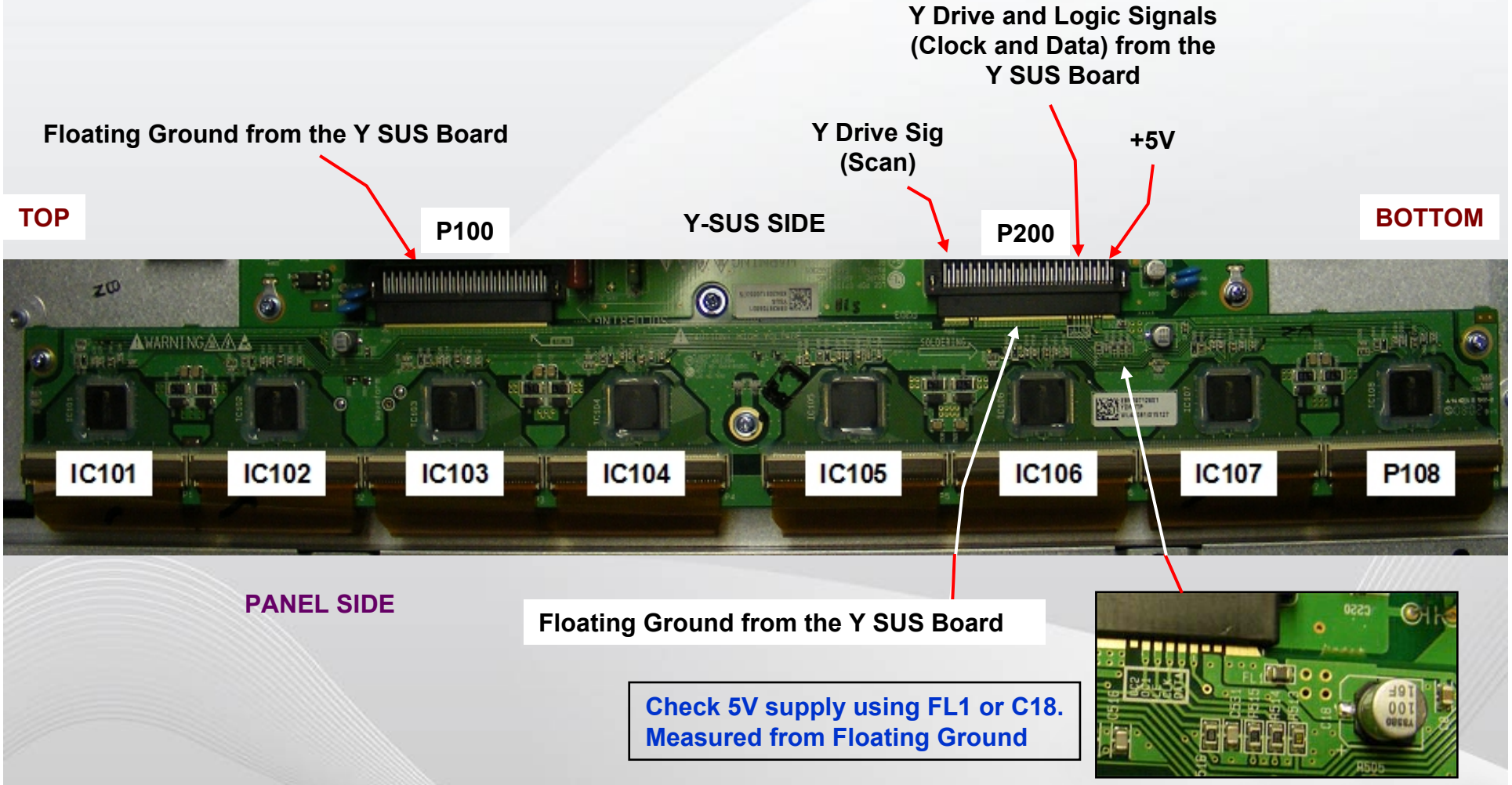
Y DRIVE WAVEFORM



To facilitate scope attachment, solder a small wire (Stand Off) at this point.

Y Drive PWB ID

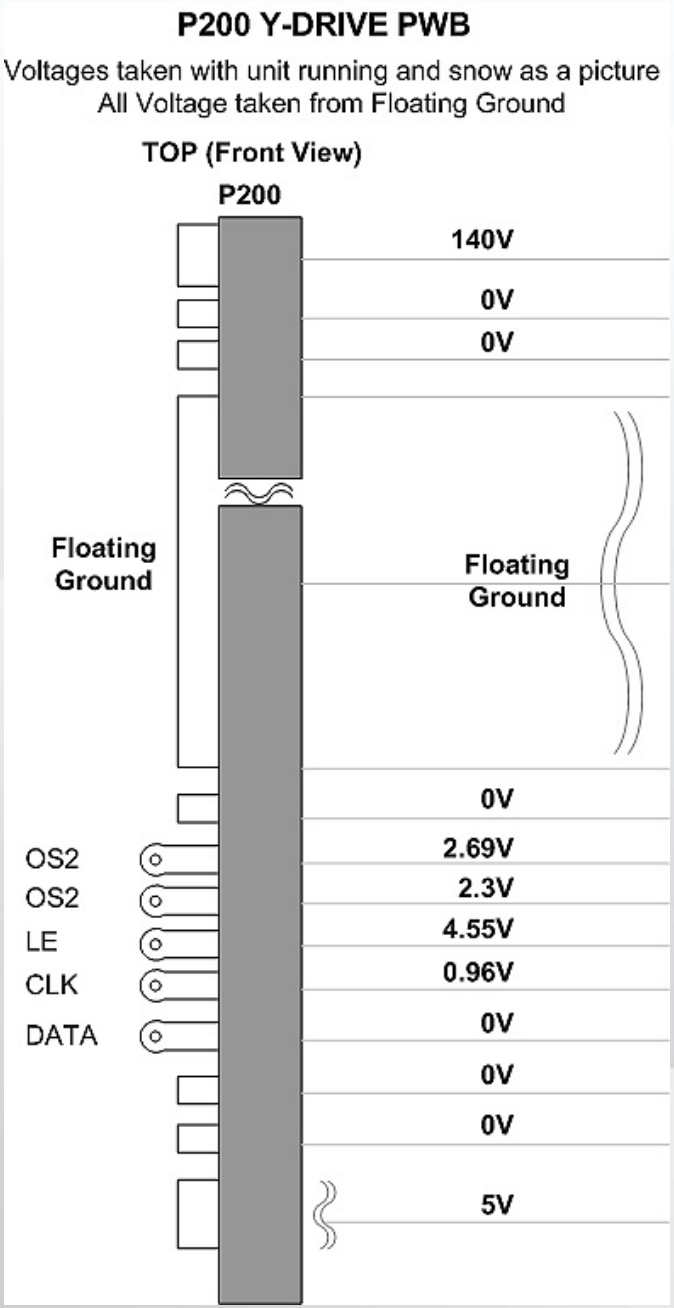
5 Volts, Y Drive and Logic Signals from Y SUS Board are supplied to the Drive Board on Connectors P200. Logic Signals from P100.



Y Drive P200 Voltage Readings

Back and Front of Connector Identical. All voltages taken from Floating Ground.

Warning: Do not hook scope ground up unless set plugged into an isolation transformer.



Removing (Panel) Flexible Ribbon from Y Drive

Flexible Ribbon Cables shown are from a different model, but process is the same.

To remove the Ribbon Cable from the connector first carefully lift the Locking Tab from the back and tilt it forward (lift from under the tab as shown in Fig 1).
The locking tab must be standing straight up as shown in Fig 2.
Lift up the entire Ribbon Cable gently to release the Tabs on each end. (See Fig 2)
Gently slide the Ribbon Cable free from the connector.

Fig 1

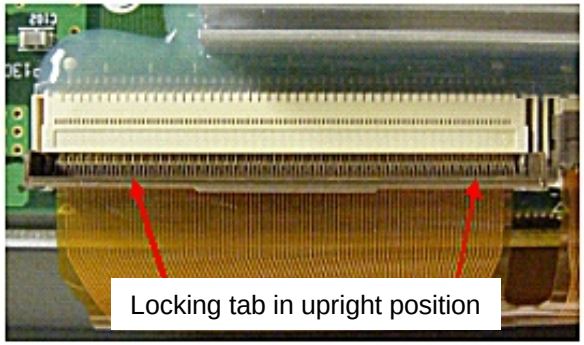


Fig 2

Fig 3

To reinstall the Ribbon Cable, carefully slide it back into the slot see (Fig 3), be sure the Tab is seated securely and press the Locking Tab back to the locked position see (Fig 2 then Fig 1).

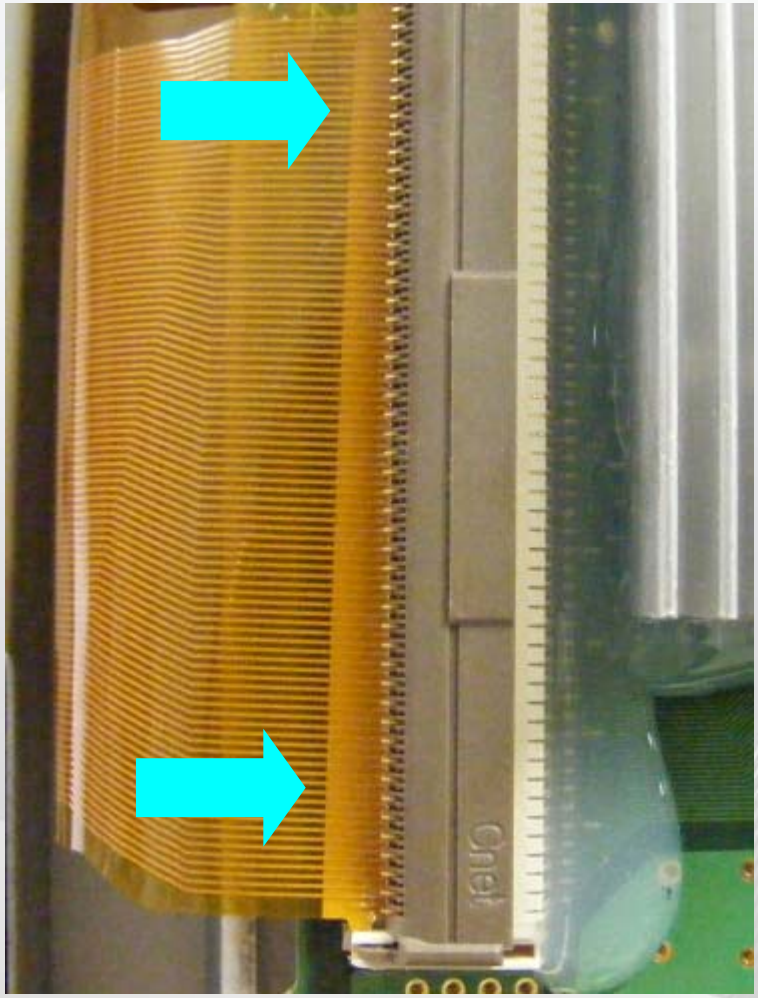
Y Drive Flexible Ribbon Incorrectly Seated

The Ribbon Cable is clearly improperly seated into the connector. You can tell by observing the linearity.

The Locking Tab will offer a greater resistance to closing in the case.

Note the cable is crooked. In this case the Tab on the Ribbon cable was improperly seated at the bottom. This can cause bars, lines, intermittent lines abnormalities in the picture.

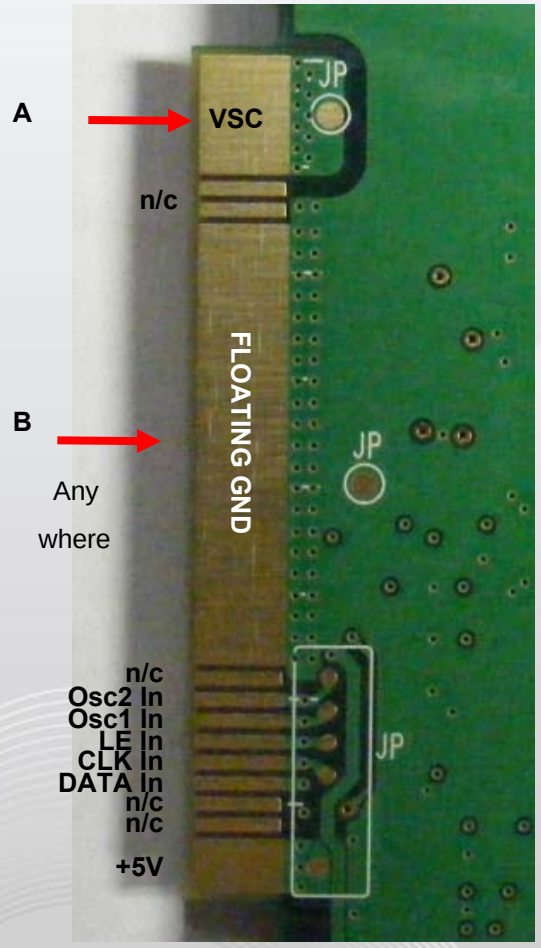
Remove the ribbon cable and re-seat it correctly.



Y Drive BUFFER Troubleshooting

YOU CAN CHECK Y-DRIVE USING THIS PROCEDURE.

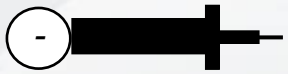
BACK or FRONT SIDE OF Y-DRIVE PWB



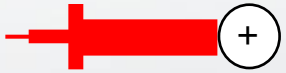
VSCAN CHECK

Using the "Diode Test" on the DVM, check the pins for shorts or abnormal loads.

FORWARD READING 0.73V



BLACK LEAD ON "A"



RED LEAD ON "B"

REVERSE READING "OPEN" OL

RED LEAD ON "A"

BLACK LEAD ON "B"

Additional Readings

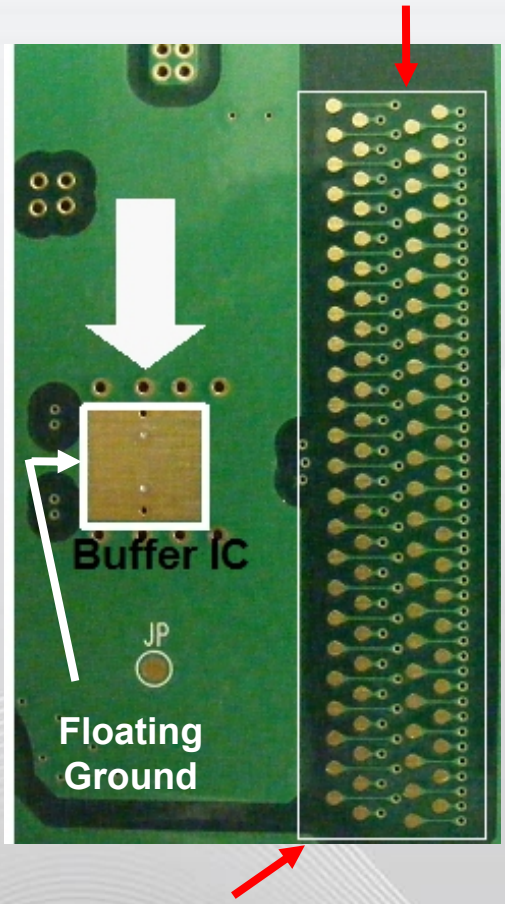
RED LEAD ON "B"	BLACK LEAD ON "B"
0.57V Black on Osc2	OL Red on Osc2
0.59V Black on Osc1	OL Red on Osc1
0.58V Black on LE	OL Red on LE
0.60V Black on CLK	OL Red on CLK
0.78V Black on DATA	OL Red on DATA
0.50V Black on +5V	OL Red on +5V

Y Drive BUFFER Troubleshooting

YOU CAN CHECK ALL 8 BUFFER ICs USING THIS PROCEDURE

BACK SIDE OF Y-DRIVE PWB

OUTPUT LUGS



Using the "Diode Test" on the DVM, check the pins for shorts or abnormal loads.

RED LEAD ON BUFFER IC

Indicated by white outline

BLACK LEAD ON "ANY" OUTPUT LUG. READING 0.73 V

BLACK LEAD ON BUFFER IC

Indicated by white outline

RED LEAD ON "ANY" OUTPUT LUG. READING "OPEN"

- **Any of these output lugs can be tested.**
- **Look for shorts indicating a defective Buffer IC**

Troubleshooting the Z-SUS Drive section of the Y-SUS PWB

This Section of the Presentation will cover troubleshooting the Z-Drive section of the Y-Z-SUS Board Assembly. Upon completion of this section the Technician will have a better understanding of the circuit and be able to locate voltage and resistance test points needed for troubleshooting and alignment.

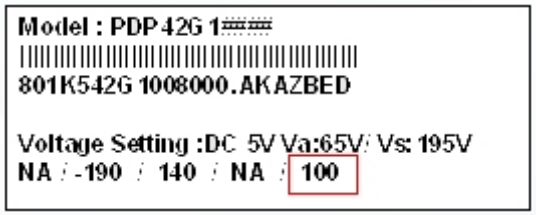
Locations

- DC Voltage and Waveform Test Points
- Z BIAS Alignment
- Resistance Test Points

Operating Voltages

Y SUS Supplied	VA
	VS
	5V Vcc
Developed on Y SUS	Z Bias

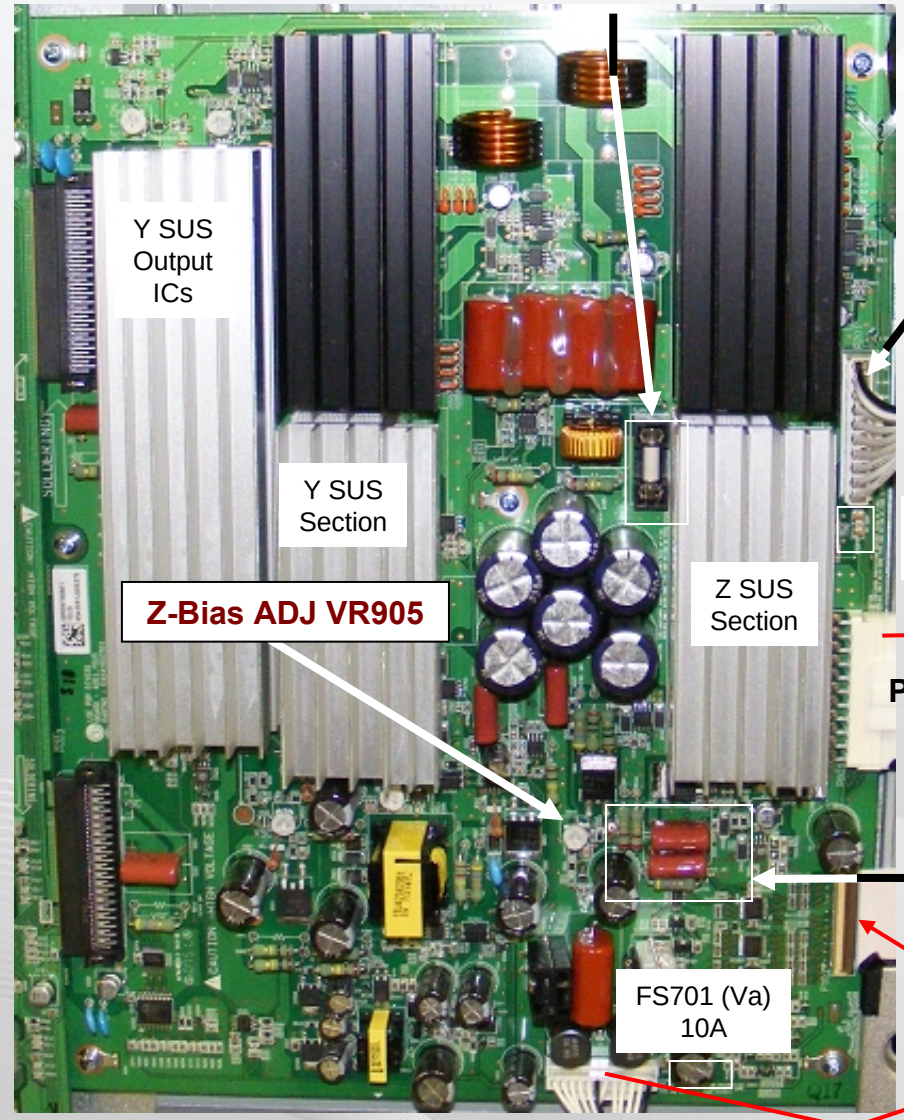
Z-SUS Section Layout on the Y-SUS PWB



VZ (Z-Bias)

No IPMs

FS202 (Vs) 4A 250V



VS and VA Input from the SMPS

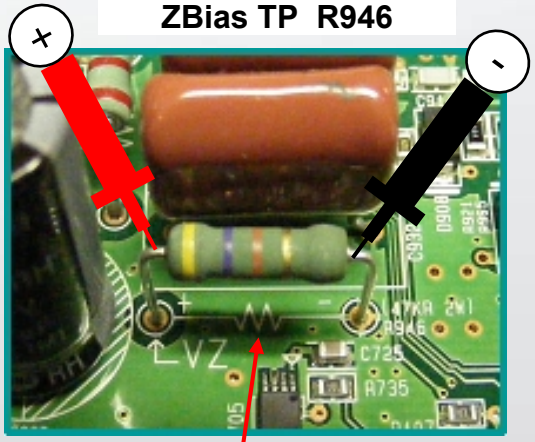
P201

FS201 (5V) 5A

P801 Z Drive to Z SUS Output PWB

Read the Label on the back of the upper left hand side of the panel. Adjust R946 to that voltage.

ZBias TP R946



VZ (Z-Bias) TP R946

P101 Logic Signals from the Control PWB

P202 16V and Va to Left and Right X PWBs

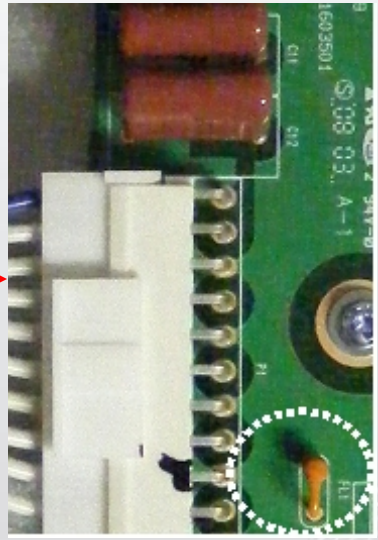
Z-SUS Waveform

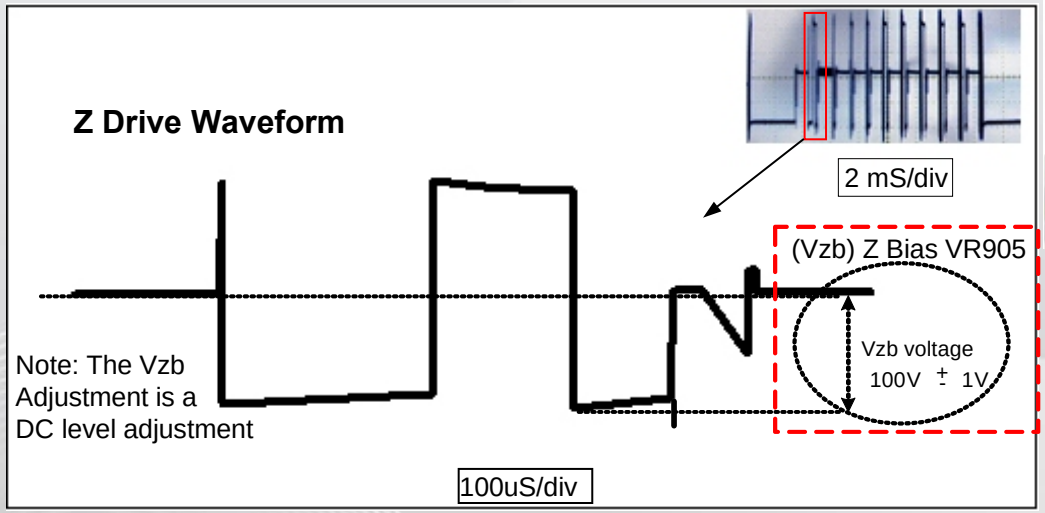
Provides the SUSTAIN PULSE and ERASE PULSE for generating SUSTAIN discharge in the panel by receiving Drive signals from the Y-Z-SUS PWB.

This waveform is supplied to the panel through FPC (Flexible Printed Circuit).

Z-Bias is a "DC" adjustment.
The effects of this adjustment can be observed on the scope looking at the Z-SUS output.

Z-SUS PWB

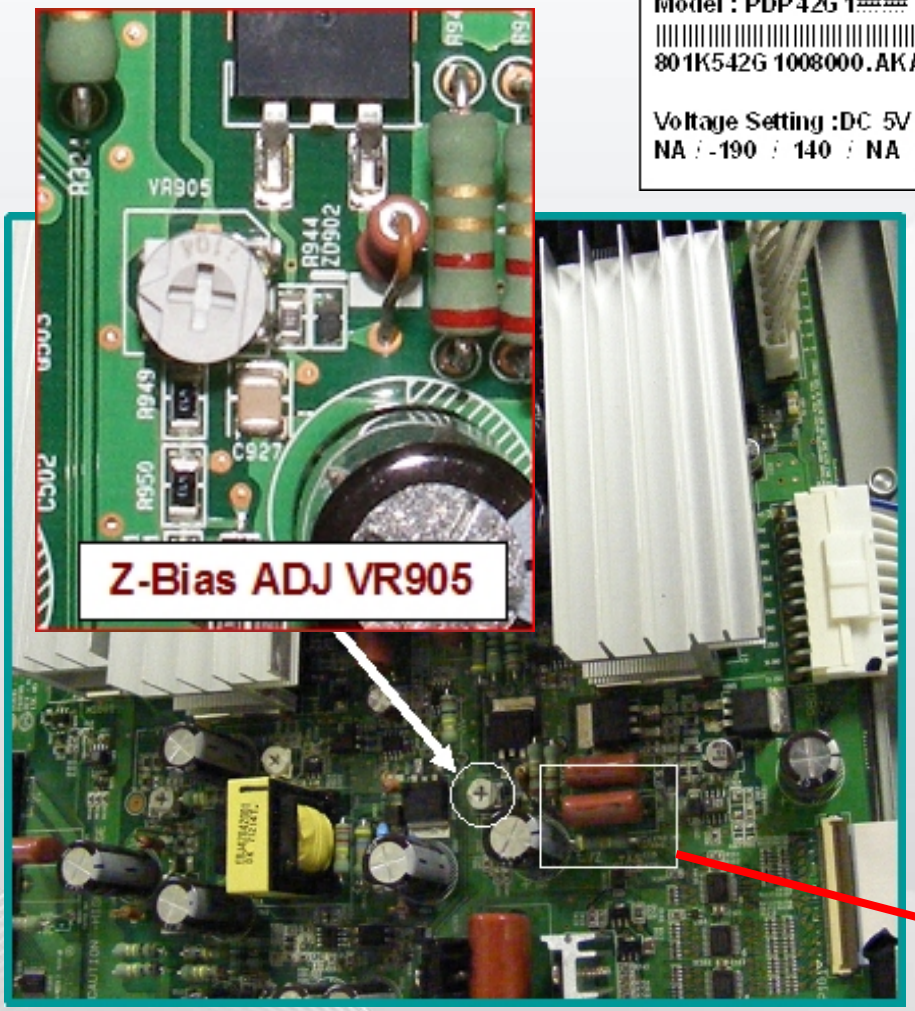




Scope Probe connect point bottom leg of R1 to check Z Output waveform

This Waveform is just for reference to observe the effects of Zbz adjustment

VZ (Z-Bias) Adjustment



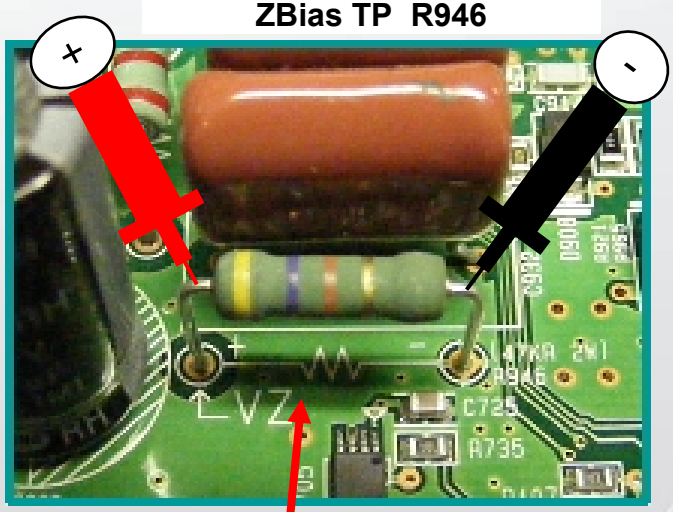
Model : PDP42G 1
801K542G 1008000.AKAZBED

Voltage Setting :DC 5V Va:65V Vs: 195V
NA / -190 / 140 / NA / 100

VZ (Z-Bias)

Read the Label on the back of the upper left hand side of the panel. Adjust R946 to that voltage.

ZBias TP R946



P801 To Z-SUS

VZ (Z-Bias) TP R946

Set should run for 15 minutes, this is the "Heat Run" mode.
Set screen to "White Wash" mode or 100 IRE White input.

Adjust VZ (Z-Bias) to 100V (+/- 1V

The Z-SUS Board in this model is only a small vertical board with output FETs. Drive waveforms are generated on the Y-SUS PWB.

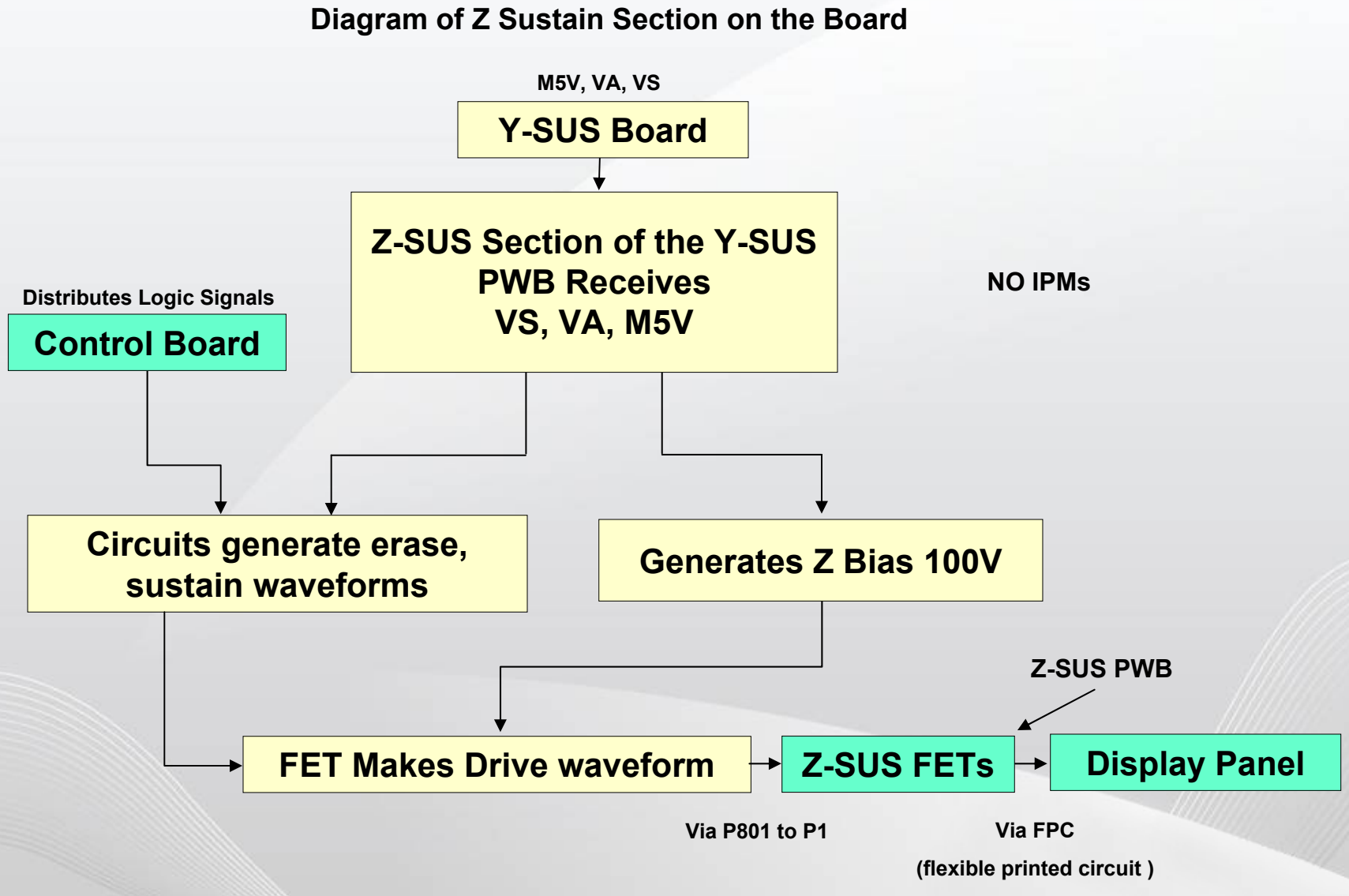
Input Voltages from the Y SUS Board

VS VS is input at P1 pin 1 and supplied to the FETs.

Input Signals from the Y SUS Board

Z Drive Signals to Power FET's

Z SUS Section(on Y-SUS Board) Block Diagram



Y-SUS P801 Connector to Z-SUS P1 Voltages and Resistance

Voltage and Resistance Measurements

P801 CONNECTOR "Y-SUS PWB" to "Z-SUS Out" P1

Pin	Label	STBY	Run	Diode Mode
1	+Vs	0V	*194V	Open
2	Gnd	Gnd	Gnd	Gnd
3	ZSUS	0V	70.46V	Open
4	Gnd	Gnd	Gnd	Gnd
5	ZSUS	0V	70.46V	Open
6	Gnd	Gnd	Gnd	Gnd
7	ZSUS	0V	70.46V	Open
8	Gnd	Gnd	Gnd	Gnd
9	ZSUS	0V	70.46V	Open
10	Gnd	Gnd	Gnd	Gnd
11	ZSUS	0V	70.46V	Open

*** Note: This voltage will vary in accordance with Panel Label**

Resistance Readings with the PCB Disconnected

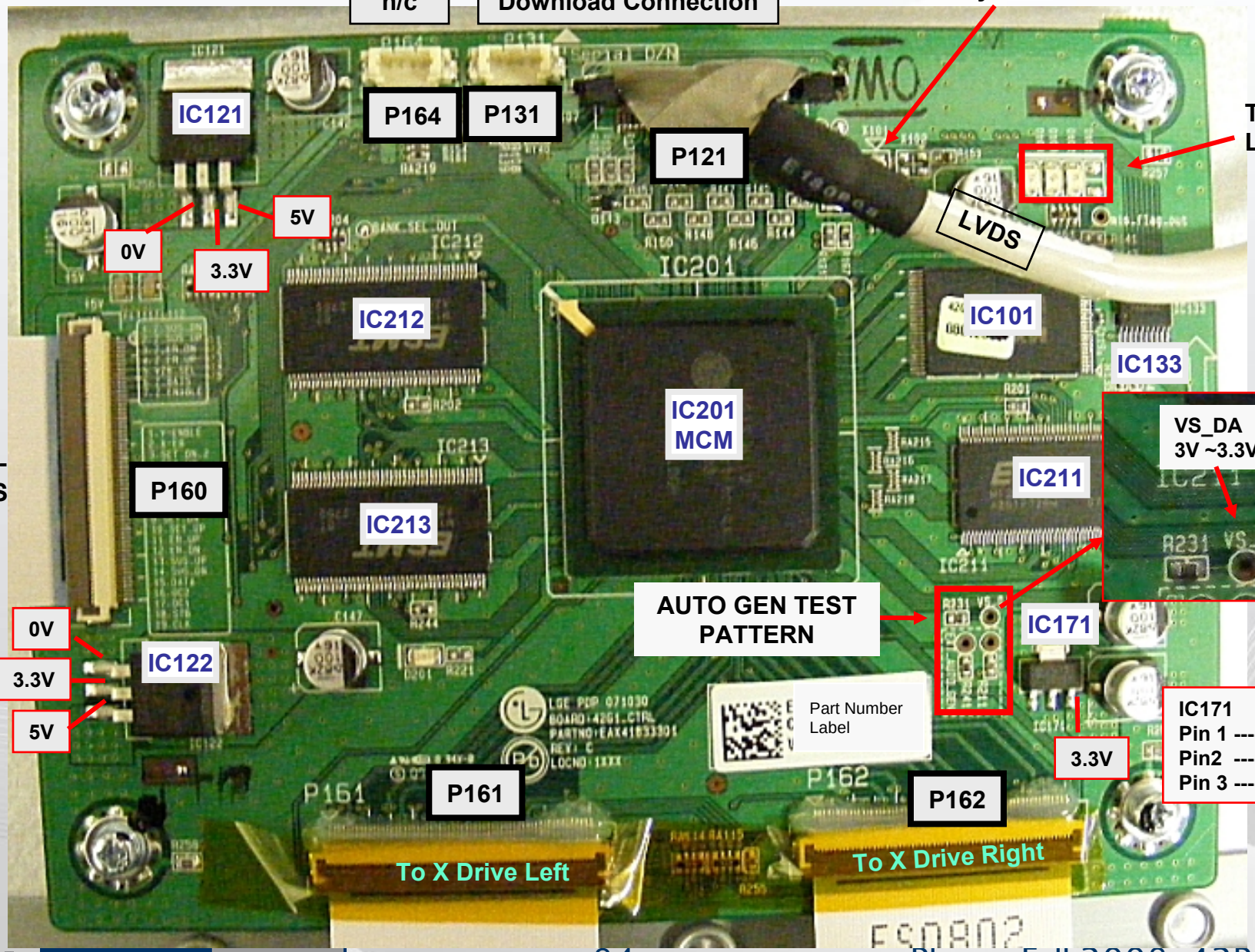
CONTROL PWB SECTION

This Section of the Presentation will cover troubleshooting the Control Board Assembly. Upon completion of this section the Technician will have a better understanding of the circuit and be able to locate voltage and resistance test points needed for troubleshooting.

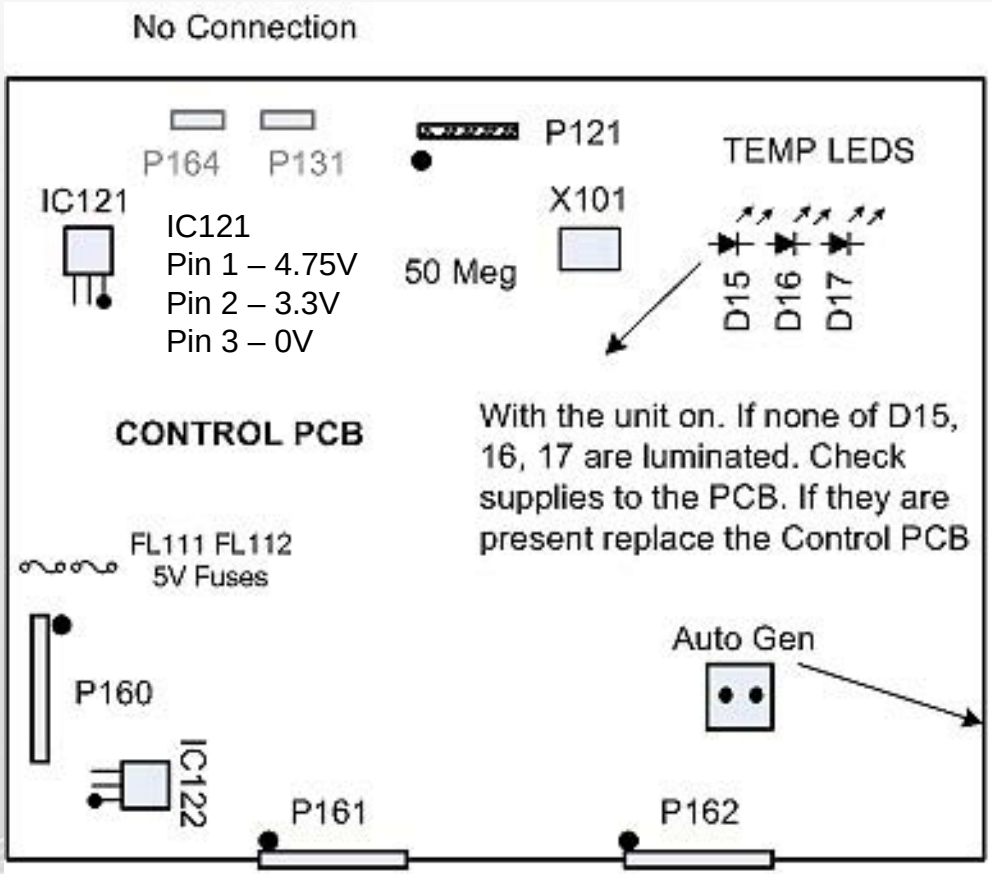
- DC Voltage and Waveform Test Points
- Resistance Test Points

Signals	Main Board Supplied	LVDS Signal
Operating Voltages	Y SUS Supplied	5V VCC
	Developed on the Control board	1.8V (2) 3.3V

Control PWB Identified



Control PWB Pictorial



Unplug all connectors. Jump 5V from SMPS (P813 pins 9~12) to pin 1 of IC121. Observe Temp LEDs. If they light, most likely Control PWB is OK. 1st check FL111 and FL112.

Disconnect P201 from the Y SUS Board and connect a Jumper from Pin 10 of P812 (M5V) to Pin 10 P201 (5V). The 5V will be routed to the Control Board via FS201, Ribbon Cable P101 on the Y SUS Board and FL111 and FL112 on the Control Board for Control Board operation verification.

Note: P812 on SMPS P201 on Y SUS

Short across the two points labeled Auto Gen to generate a test pattern.

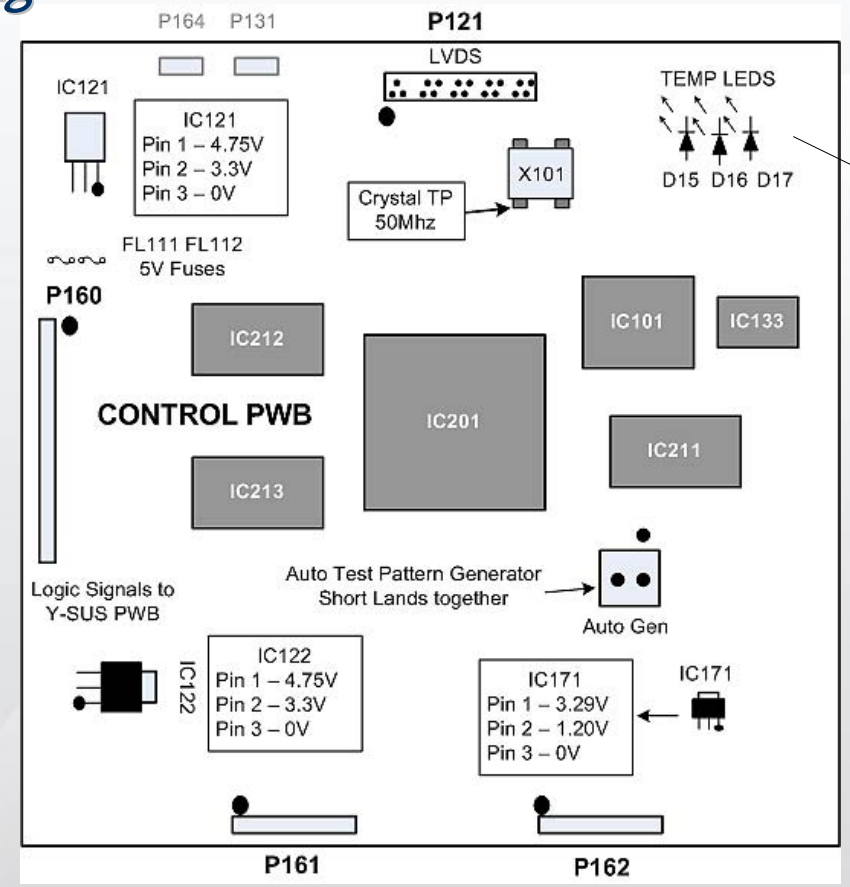
IC122
Pin 1 – 4.75V
Pin 2 – 3.3V
Pin 3 – 0V

* If the complaint is no video and shorting the points (AutoGen) causes video to appear suspect the Digital PCB.

Control PWB Testing

For quick PWB test.
(All PWB connectors Disconnected).

Jump 5V from Power Supply to IC121 Pin 1.
If the Temp LED lights, Pretty much guaranteed, PWB is OK.

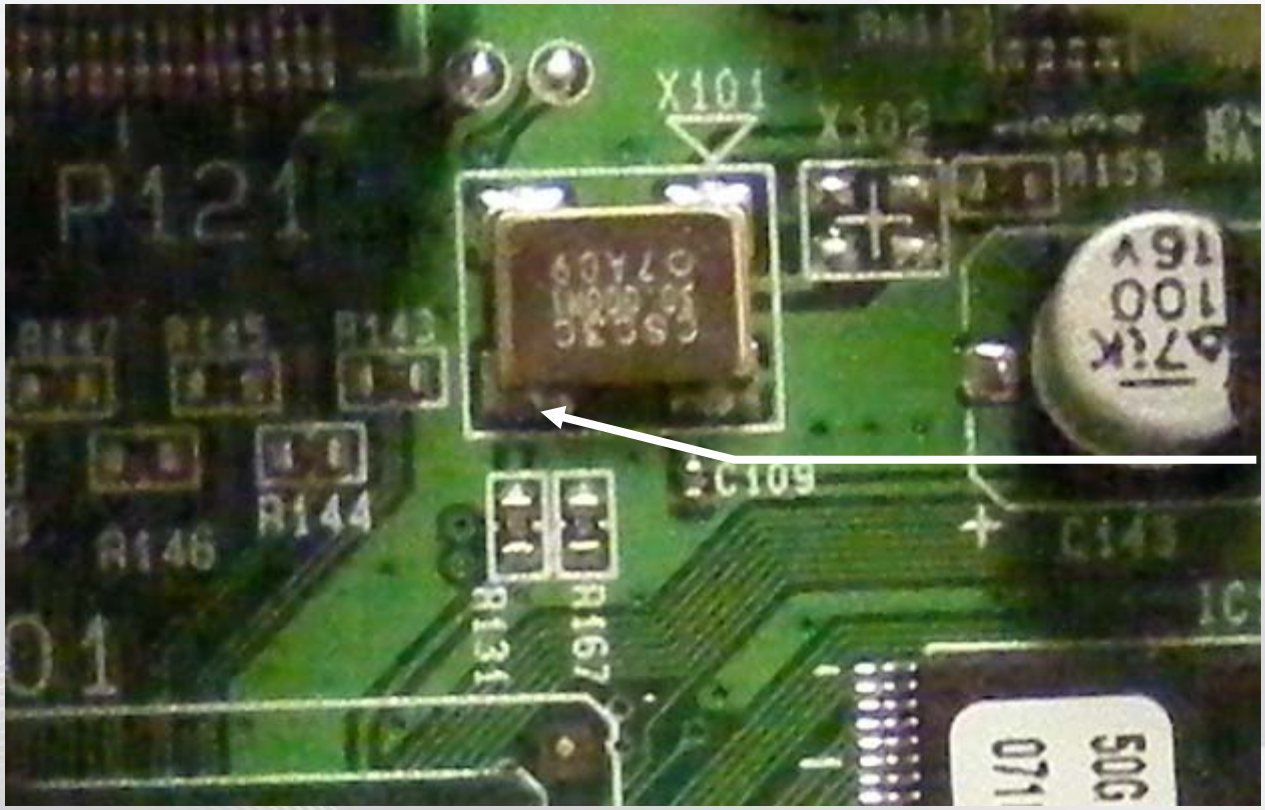


Quick observation Of Temp. LEDs Tell if the Control Board is running.

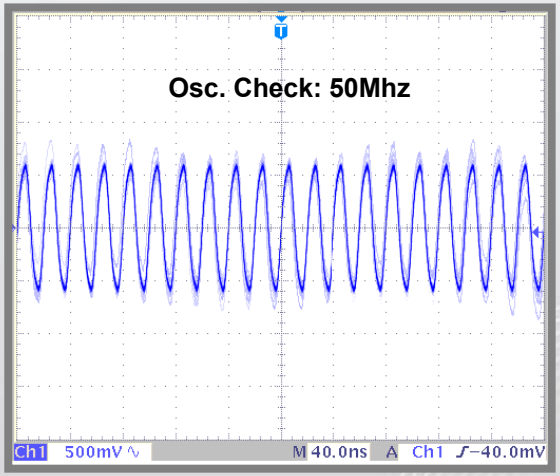
Confirm B+ to Control PWB
VS_DA
Control PWB Check
3V ~ 3.3V

When the Television has a problem related to;
1) Shutdown caused by Main PWB
2) No Picture
This can be checked by the following.
(1) Disconnect the Main PWB from all connectors. Apply AC power.
Since P813 is not connected, the set will come on. Short the two pins on the Auto Test Pattern lands.
If there is a picture of cycling colors, the Y-SUS, Y-Drive, Z-SUS, Power Supply,
Control PWBs and Panel are all OK.
Same test for (2) to tell if the No Video is caused by the Main PWB.

Checking the Crystal "Clock"



DC Voltage Check
1.5V ~ 1.8V



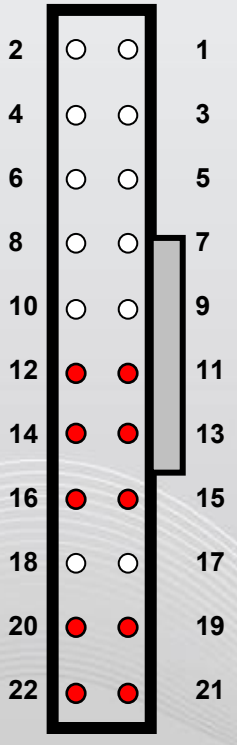
Check the output of the Oscillator package. The frequency of the sine wave is 50 MHZ.
Missing this clock signal can halt operation of the unit

Control LVDS Signals

LVDS Cable
P121 on Control PWB shown.
Press two outside tabs inward to release.

P302 on Main Board

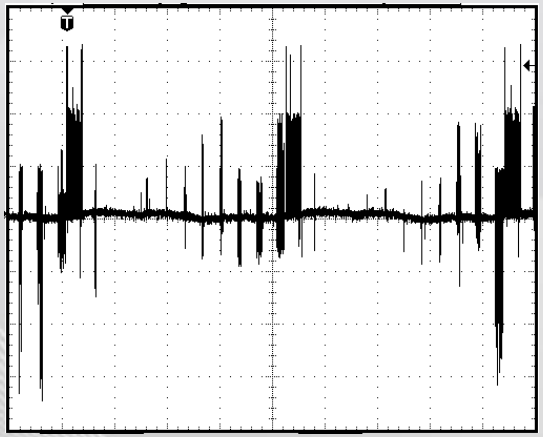
Connector P302 Configuration
● - indicates signal pins.



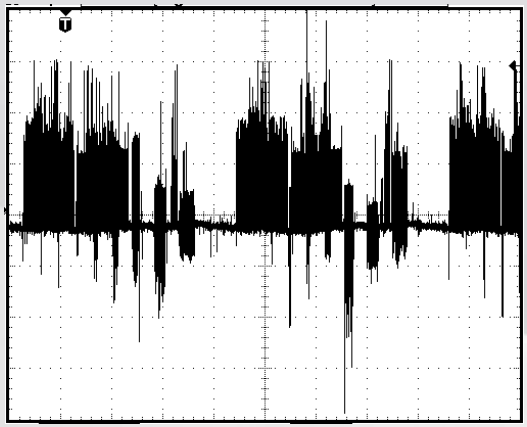
LVDS

Video Signals from the Main Board to the Control Board are referred to as Low Voltage Differential Signals or LVDS. Their presence can be confirmed with the Oscilloscope by monitoring the LVDS signals with no input signal selected while pressing the Menu Button “on” and “off” with the Remote Control or Keypad. Loss of these Signals would confirm the failure is on the Main Board!

Menu Off



Menu ON



Example of Normal Signals measured at 200mv/cm at 5µs/cm.

Control PWB Signal Block

The Control Board supplies Video Signals to the TCP (Tape Carrier Package) ICs.

If there is a bar defect on the screen, it could be a Control Board problem.

Control Board to X Board Address Signal Flow

This Picture shows Signal Flow Distribution to help determine the failure depending on where the it shows on the screen.

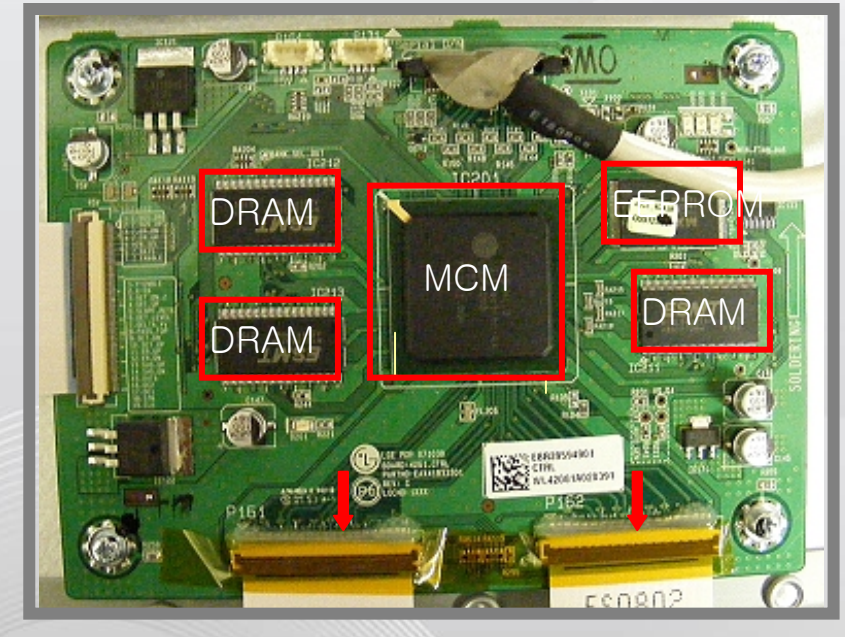
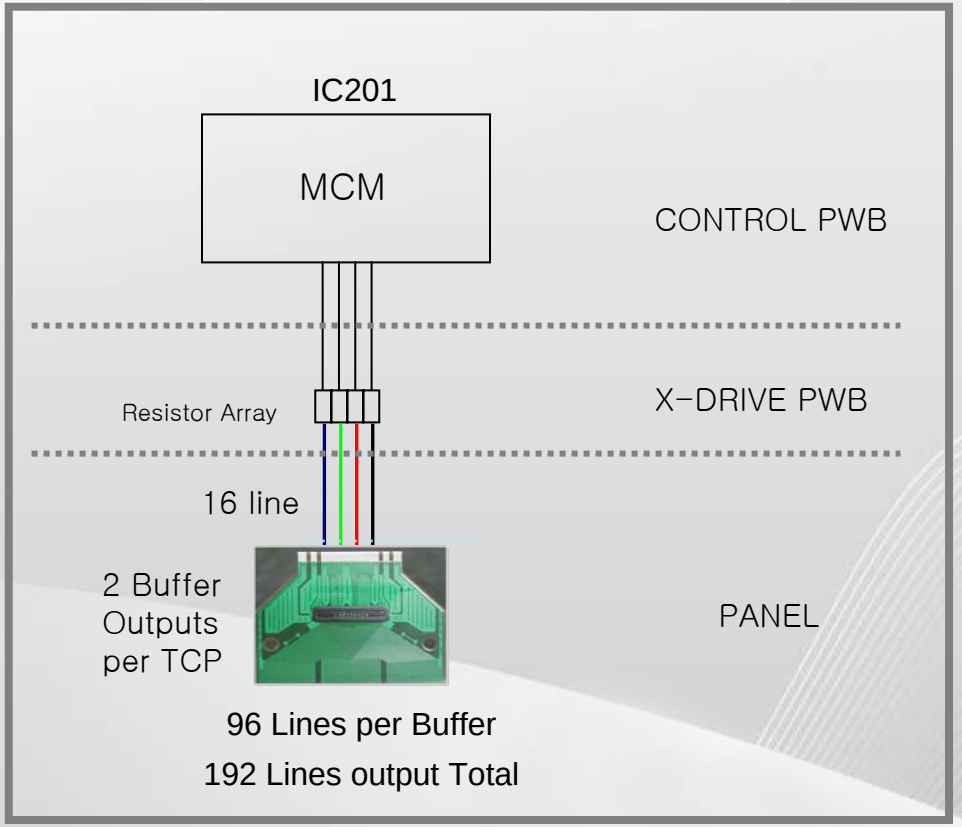


Diagram of Control Board

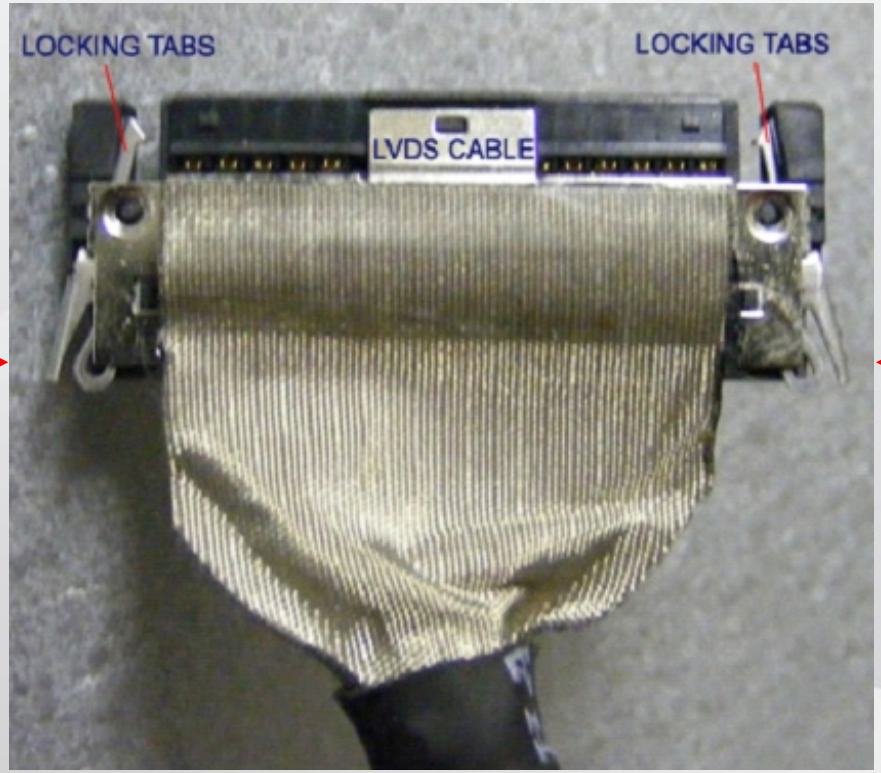


Removing the LVDS Cable from the Control PWB

The LVDS Cable has two “Interlocks” that must be disengaged to remove the LVDS Cable.

To Disengage, press the two Locking Tabs Inward and pull the plug out.

Press Inward



Press Inward

Control Connector P121 (LVDS) to Main PWB P302

Voltage and Resistance Measurements for the Control Board

P121 CONNECTOR Odd Pins "Control" to P302 "Main"

Pin	SBY	Run	Diode Mode
1	Gnd	Gnd	Gnd
3	0V	0V	1V
5	0V	1.19V	1V
7	0V	1.26V	1V
9	0V	0V	1V
11	0V	1.15V	1V
13	Gnd	Gnd	Gnd
15	0V	0V	1V
17	0V	0V	1V
19	Gnd	Gnd	Gnd
21	0V	0V	1V
23	0V	5.29V	2.4V
25	0V	1.2V	1V
27	0V	3.29V	1.3V
29	0.89V	3.29V	Open
31	Gnd	Gnd	Gnd

P121 CONNECTOR Even Pins "Control" to P302"Main"

Pin	SBY	Run	Diode Mode
2	0V	0V	1V
4	0V	1.26V	1V
6	0V	0V	Gnd
8	0V	1.19V	1V
10	0V	0V	1V
12	0V	1.26V	1V
14	0V	0V	Gnd
16	0V	0V	1V
18	0V	0V	1V
20	0V	0.21V	1V
22	0.89V	0.56V	2.5V
24	0V	1.26V	1V
26	Gnd	Gnd	Gnd
28	0.89V	3.29V	Open
30	0V	0V	Open

Resistance Readings with the PCB Disconnected

Control PWB Connector P160 to Y-SUS P101 Voltages and Resistance

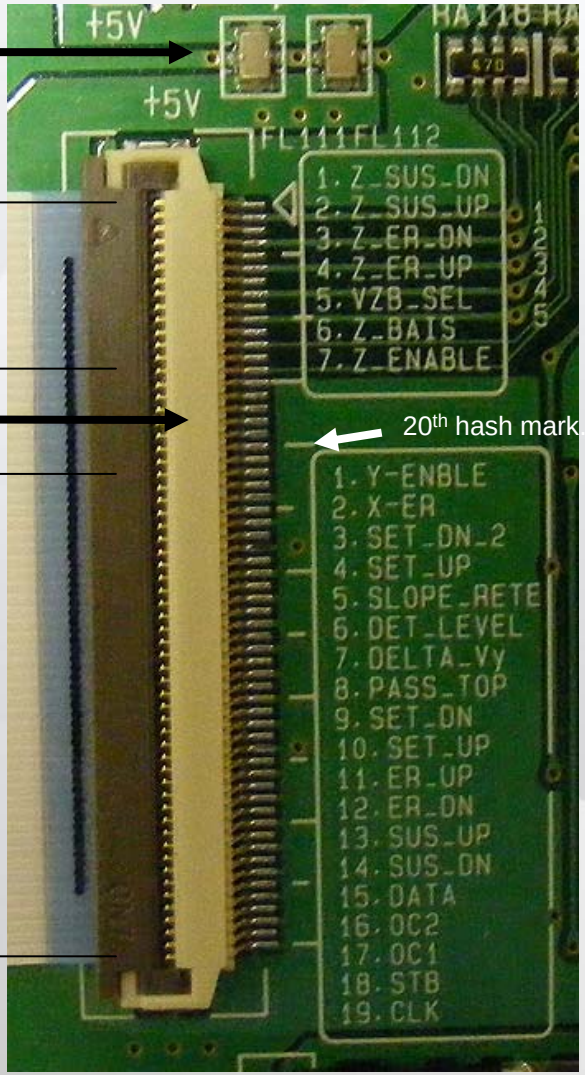
P160 These pins are very close together. When taking Voltage measurements use Caution.

FL111 and FL112 5V Fuse

14 Pins related to Z-SUS

Pins 17, 18, 19, 20 and 21 Deliver +5V to the Control PWB from the Y-SUS.
Easy to check using 20th hash mark.

39 Pins related to Y-SUS



This labeling refers to P160 pin ID. This too has ground between each pin. These are responsible for Z Drive signals.

This connector is a little confusing in its labeling.
It is actually a 60 pin connector.

This shows the Pin Labeling that is shown on the silk screening.

Remember, this connector has many more pins than the labels indicate.

Actual Pin 1 (ground) 2 (Z-SUS-DN) 3 (ground) 4 (Z-SUS-UP) 5 (ground), etc….

In other words, there is a ground between each pin except the +5V area.

Control P160 to Y-SUS P101 Plug Information

Pin 1 on Control is Pin 60 on Y-SUS

Resistance Readings with the PCB Disconnected using the Diode mode on the DVM

Pin	Label	STBY	Run	Diode Mode
1	Gnd	Gnd	Gnd	Gnd
2	Z-SUS_DN	0V	1.15V	1.31V
3	Gnd	Gnd	Gnd	Gnd
4	Z-SUS_UP	0V	0.35V	1.31V
5	Gnd	Gnd	Gnd	Gnd
6	Z-ER_DN	0V	1.35V	1.31V
7	Gnd	Gnd	Gnd	Gnd
8	Z-ER_UP	0V	1.25V	1.31V
9	Gnd	Gnd	Gnd	Gnd
10	VZB-SEL	0V	0V	1.31V
11	Gnd	Gnd	Gnd	Gnd
12	Z-BIAS	0V	1.71V	1.31V
13	Gnd	Gnd	Gnd	Gnd
14	Z-ENABLE	0V	0V	1.31V
15	n/c	n/c	n/c	n/c
16	n/c	n/c	n/c	n/c
17	5V	OV	4.75V	1.06V
18	5V	OV	4.75V	1.06V
19	5V	OV	4.75V	1.06V
20	5V	OV	4.75V	1.06V

Pin	Label	STBY	Run	Diode Mode
21	5V	OV	4.75V	1.06V
22	n/c	n/c	n/c	n/c
23	Y-Enable	0V	0.6V	1.33V
24	Gnd	Gnd	Gnd	Gnd
25	X_ER	0V	2.9V	1.33V
26	Gnd	Gnd	Gnd	Gnd
27	Set_DN_2	0V	1.4V	1.34V
28	Gnd	Gnd	Gnd	Gnd
29	SET_UP	0V	1.9V	1.34V
30	Gnd	Gnd	Gnd	Gnd
31	SLOPE_RETE	0V	0V	1.34V
32	Gnd	Gnd	Gnd	Gnd
33	DET_LEVEL	0V	0V	1.34V
34	Gnd	Gnd	Gnd	Gnd
35	DELTA_Vy	0V	0.16V	1.34V
36	Gnd	Gnd	Gnd	Gnd
37	PASS_TOP	0V	0.2V	1.34V
38	Gnd	Gnd	Gnd	Gnd
39	Set_DN2	0V	0.2V	1.34V
40	Gnd	Gnd	Gnd	Gnd

Pin	Label	STBY	Run	Diode Mode
41	SET_UP	0V	0.26V	1.34V
42	Gnd	Gnd	Gnd	Gnd
43	ER_UP	0V	2V	1.34V
44	Gnd	Gnd	Gnd	Gnd
45	ER_DN	0V	1.2V	1.34V
46	Gnd	Gnd	Gnd	Gnd
47	SUS_UP	0V	2V	1.34V
48	Gnd	Gnd	Gnd	Gnd
49	SUS_DN	0V	0V	1.34V
50	Gnd	Gnd	Gnd	Gnd
51	DATA	0V	0.6V	1.34V
52	Gnd	Gnd	Gnd	Gnd
53	OSC2	0V	3V	1.34V
54	Gnd	Gnd	Gnd	Gnd
55	OSC1	0V	0V	1.34V
56	Gnd	Gnd	Gnd	Gnd
57	STB	0V	0.76V	1.34V
58	Gnd	Gnd	Gnd	Gnd
59	CLK	0V	3.2V	1.34V
60	Gnd	Gnd	Gnd	Gnd

(All 5V Lines 17~21 Resistance in Ohms readings are 1.7K)

Control PWB Connector P161 and P162 to X-Drive PWBs

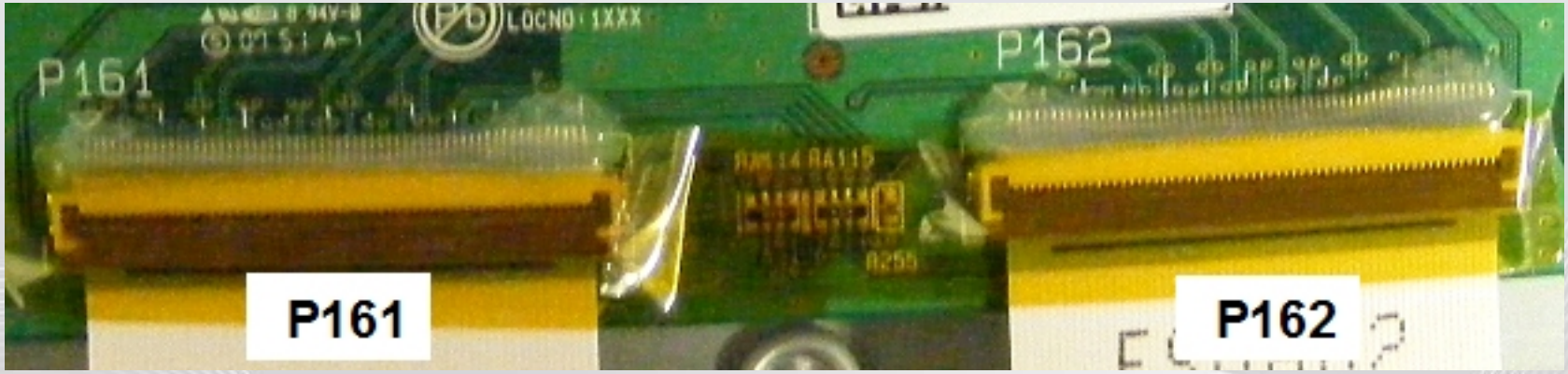
Voltage and Resistance Measurements can't be made.

P161 CONNECTOR "Control PWB" to "X Drive Left" P232

These pins are covered in silicon

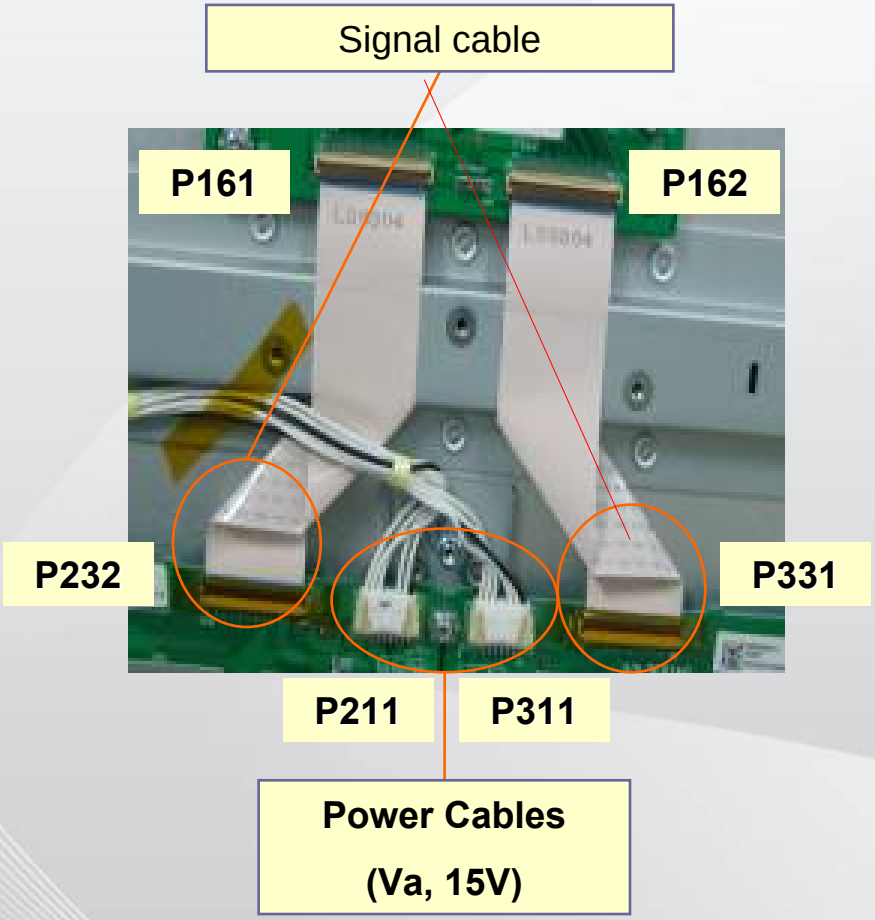
P162 CONNECTOR "Control PWB" to "X Drive Right" P331

These pins are covered in silicon

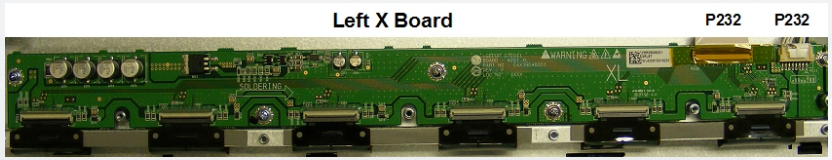


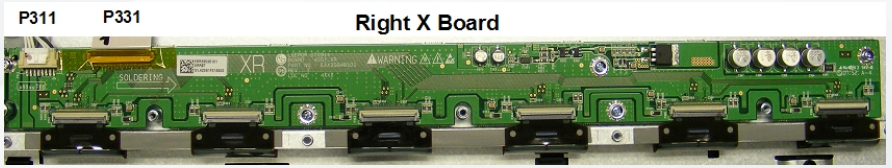
Control PWB Connectors to X Drive PWB

Between Ctrl. B/D and X-B/D measurements can't be made.



Left and Right X Drive Board Troubleshooting



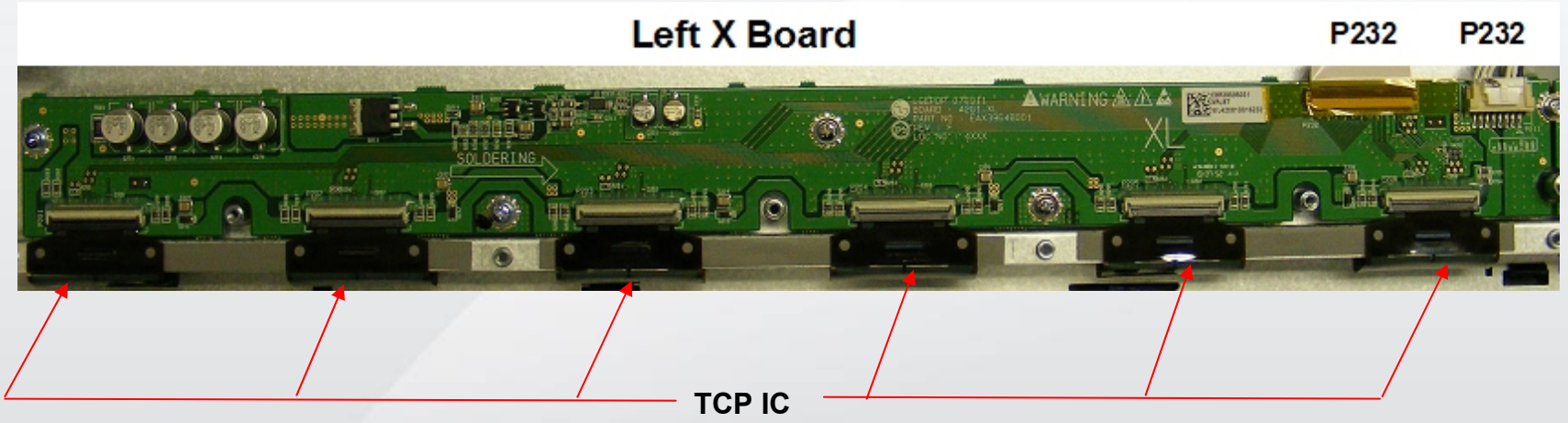


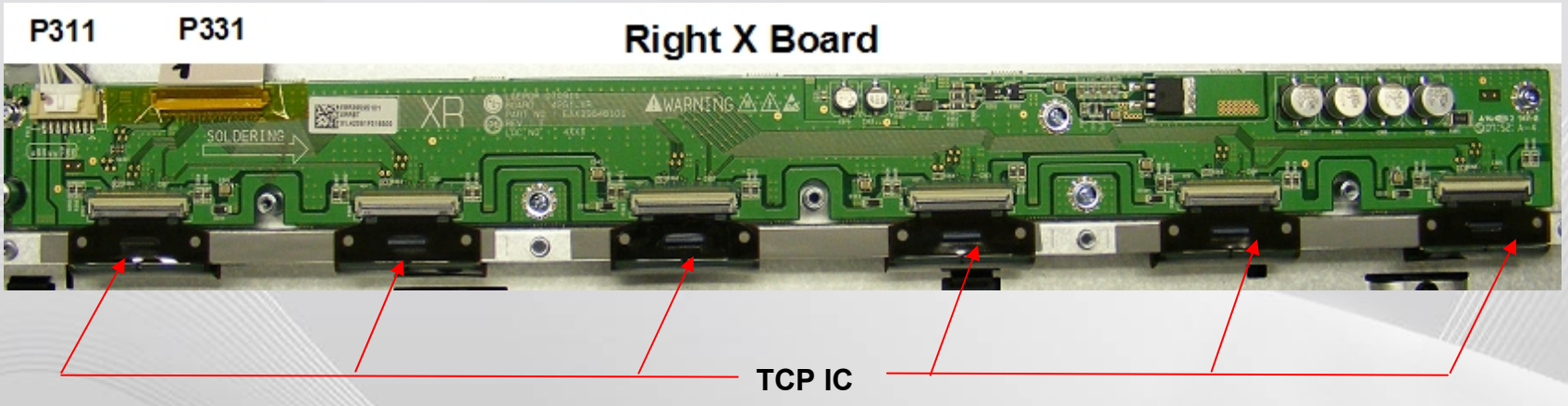
RECEIVED:
Va: (Voltage for Address) received from the Y-SUS board
15V: received from the Y-SUS board
Drive signals (Color): Received from the Control Board for the Vertical Grids to the TCPs.

DEVELOPED:
Developed on the X-Drive boards: VPP to help with over all current draw during "No Video" times when the panel is being driven. VPP shuts off the TCPs during this time. VPP is generated using Va and a drive signal from the Control board.

Left and Right X Drive (A-BUS)

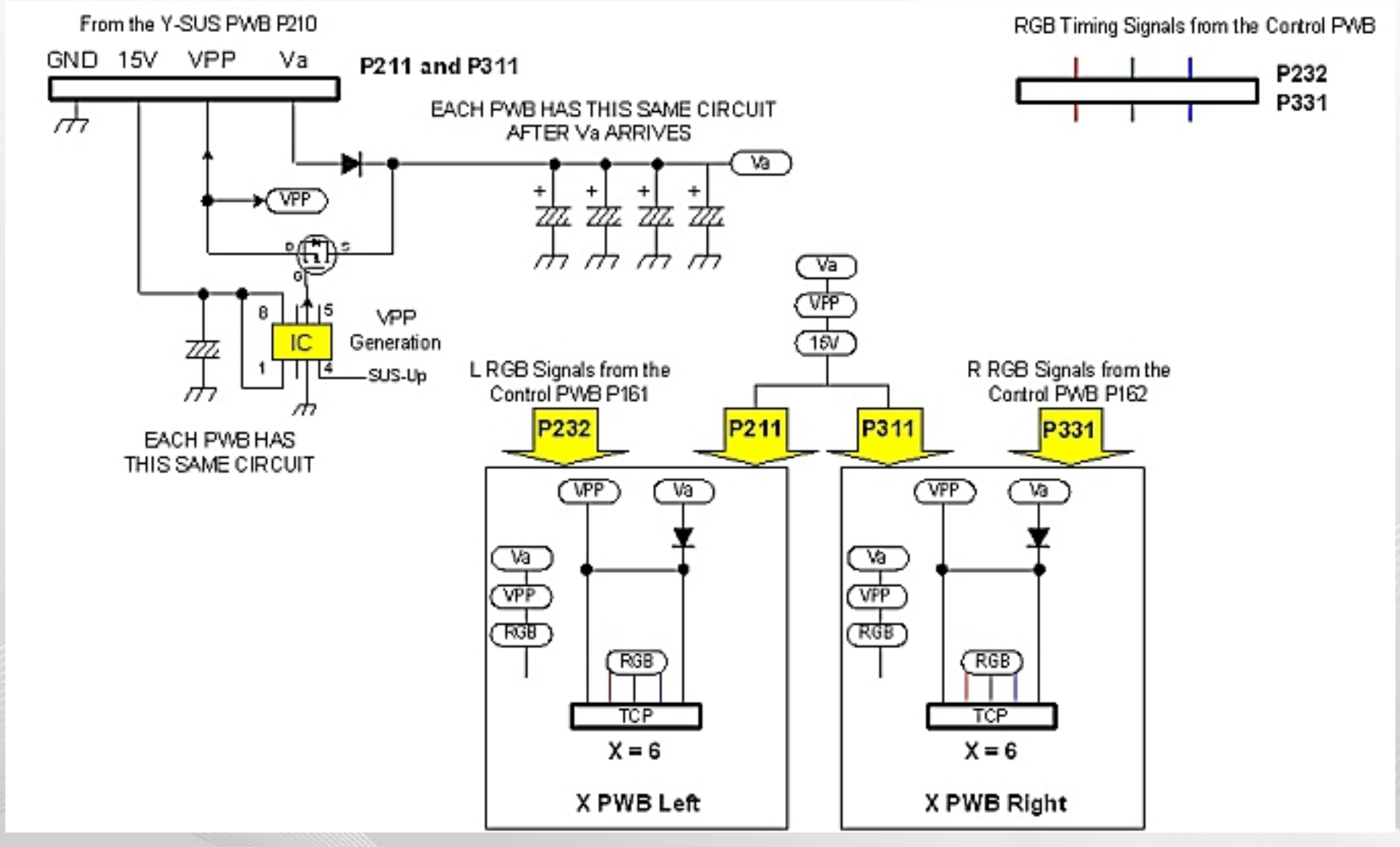
Warning: DO NOT attempt to run the set with the Heat Sink over the TCPs removed. After a very short time, these ICs will begin to self destruct due to overheating.





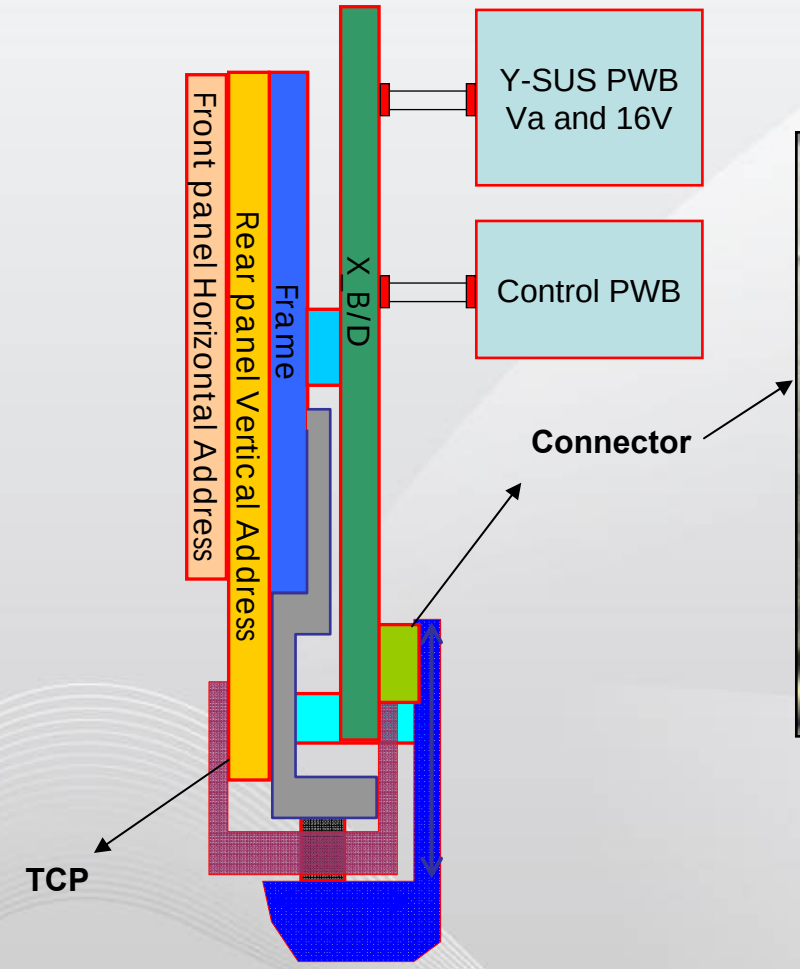
TCP IC's shown are part of the Ribbon Cable

TCP (Tape Carrier Package)

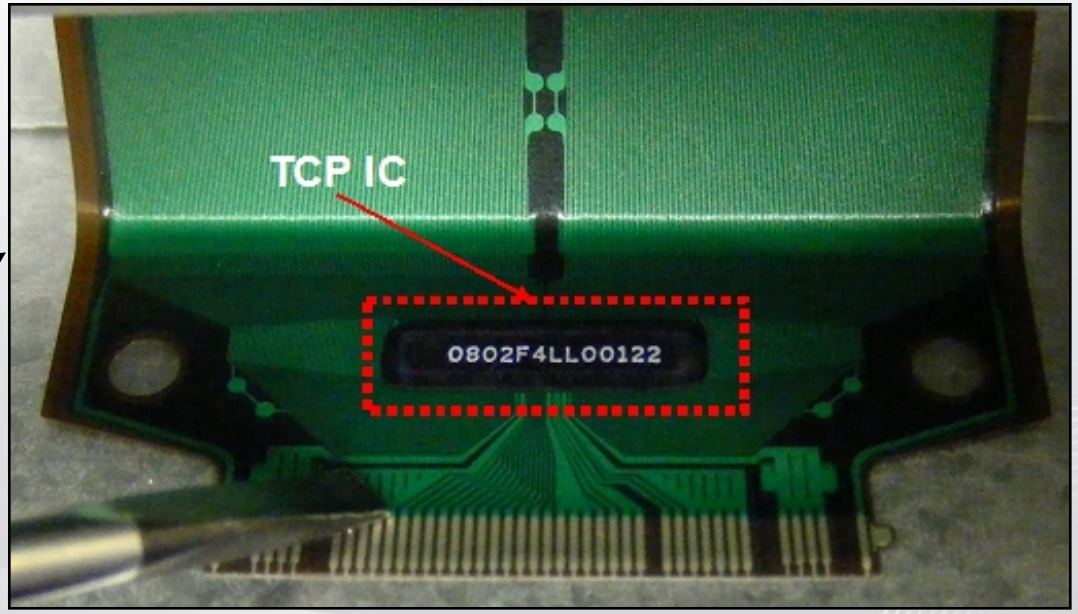


TCP (Tape Carrier Package)

TCP ICs receive RGB 16 bit signal to the PDP by connecting the PAD Electrode of the PANEL with the X Board.



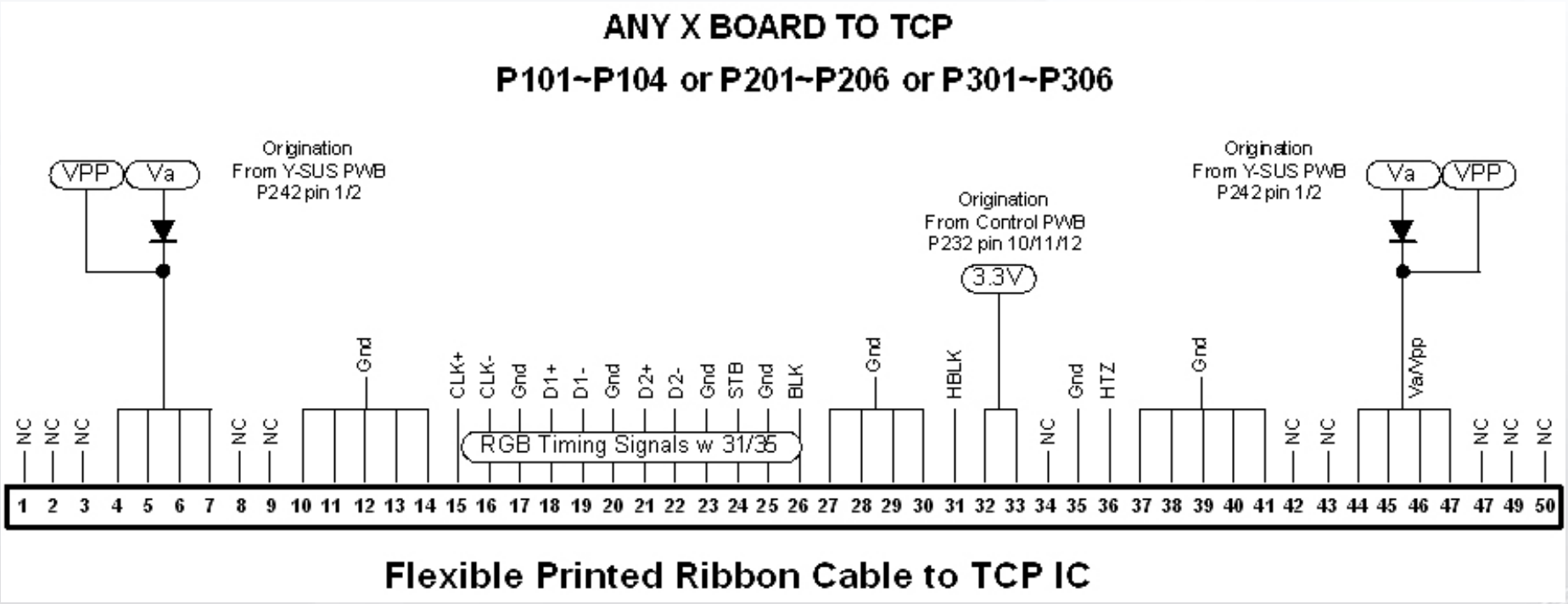
To Panel



Back side of Ribbon

Connector into X-Drive

TCP Testing



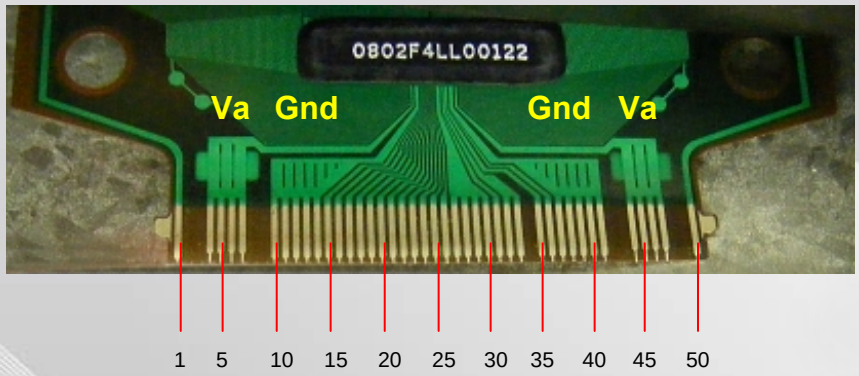
On any Gnd

10,11,12,13,14,27,28,29,30,37,38,39,40,41

On any Va

4,5,6,7,44,45,46,47

Typical Reading 0.65V
Opposite reads open



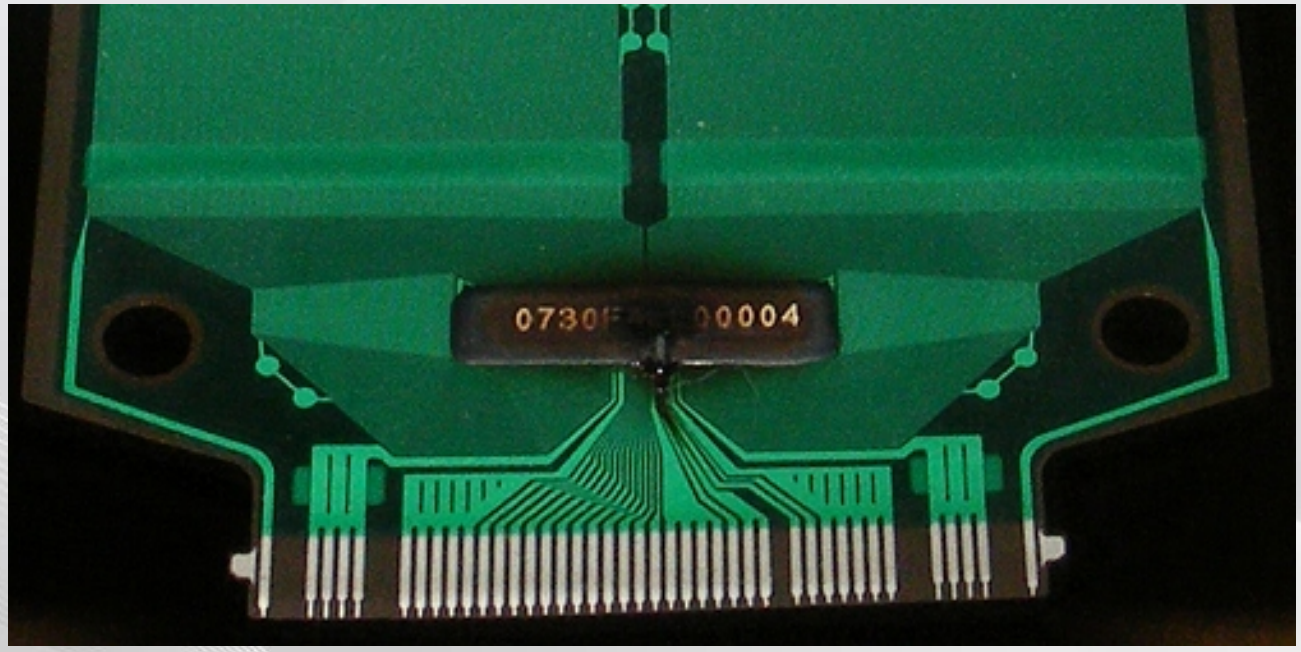
Look for any TCPs being discolored.
Ribbon Damage. Cracks, folds Pinches, scratches, etc…

TCP Visual Observation. Damaged TCP

Warning: DO NOT attempt to run the set with the Heat Sink over the TCPs removed. After a very short time, these ICs will begin to self destruct due to overheating.

This damaged TCP can,

a) Cause the Power Supply to shutdown
b) Generate abnormal vertical bars
c) Cause the entire area driven by the TCP to be “All White”
d) Cause the entire area driven by the TCP to be “All Black”
e) Cause a “Single Line” defect



X Drive Left Connector P211 Voltages and Resistance

Voltage and Resistance Measurements for the X Drive Board

P211 CONNECTOR "X Drive Left" to "Y-SUS" P202

Pin	Label	STBY	Run	Diode Mode
1	Gnd	0V	Gnd	Gnd
2	Gnd	0V	Gnd	Gnd
3	15V	0V	15.4V	Open
4	n/c	0V	n/a	n/a
5	n/c	0V	n/a	n/a
6	VPP/ER1	0V	*61.4V	Open
7	VPP/ER1	0V	*61.4V	Open
8	VA	0V	*64.9V	Open

*** Note: This voltage will vary in accordance with Panel Label**

Resistance Readings with the PCB Disconnected

X Drive Right Connector P311 Voltages and Resistance

Voltage and Resistance Measurements for the X Drive Board

P311 CONNECTOR "X Drive Right" to "Y-SUS" P202

Pin	Label	STBY	Run	Diode Mode
1	Gnd	Gnd	Gnd	Gnd
2	Gnd	Gnd	Gnd	Gnd
3	15V	0V	15V	Open
4	n/c	0V	n/a	n/a
5	n/c	0V	n/a	n/a
6	VPP/ER2	0V	*61.4V	Open
7	VPP/ER2	0V	*61.4V	Open
8	VA	0V	*64.9V	Open

*** Note: This voltage will vary in accordance with Panel Label**

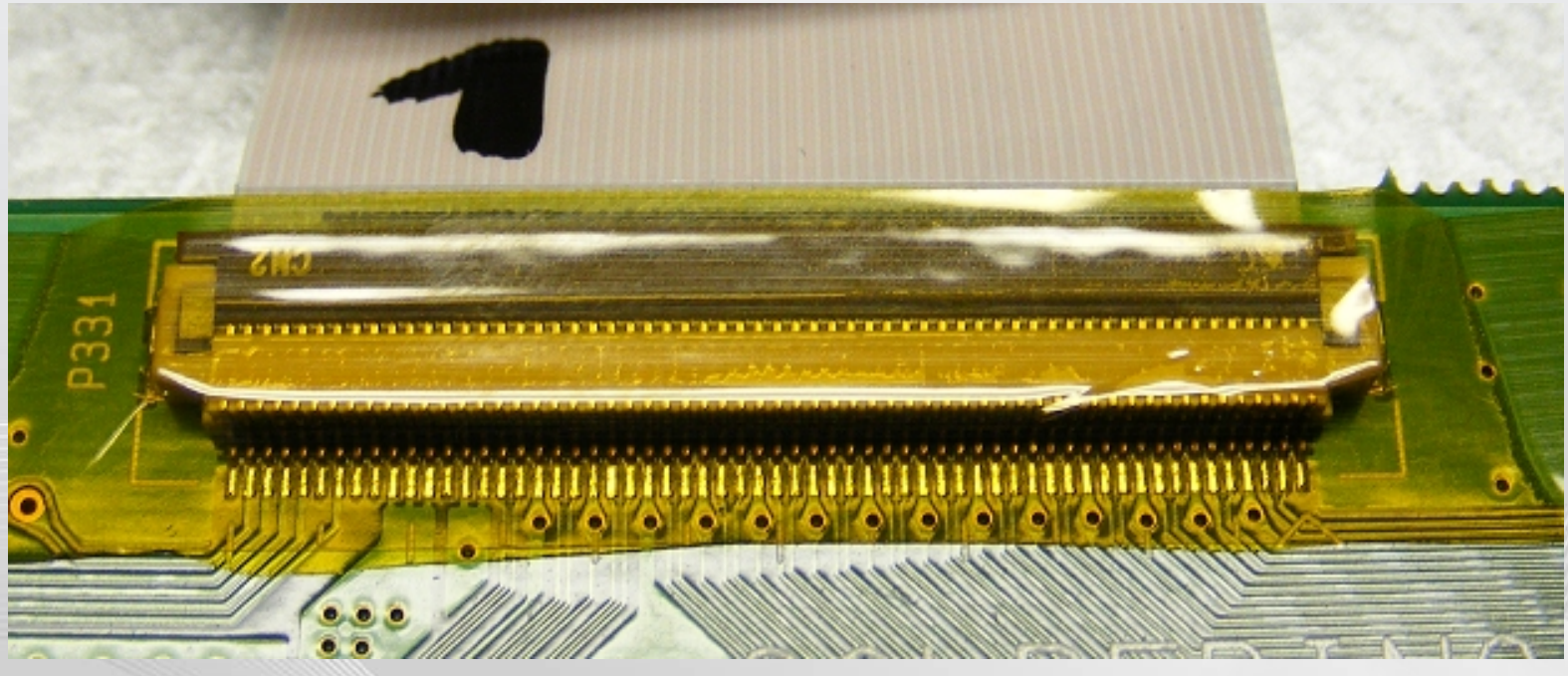
Resistance Readings with the PCB Disconnected

X Drive Left and Right Connector P232 and P331

Voltage and Resistance Measurements for the X Drive Board

Voltage and Resistance Measurements for these connectors are difficult to read. They are too close together for safe test.

The pins are also protected by a layer of tape to prevent the tab from being released causing separation from the Cable and the connector.



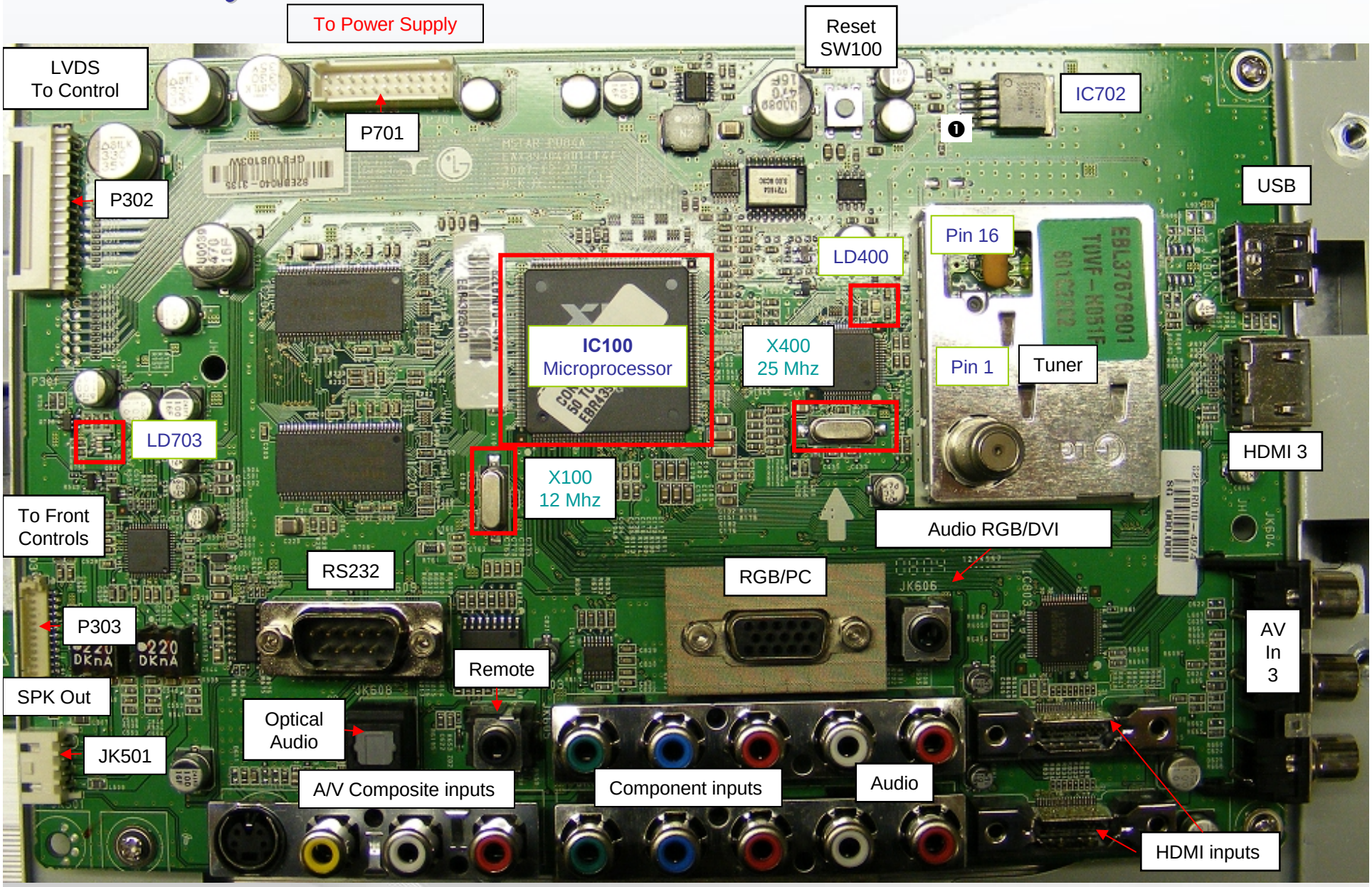
Main PWB Troubleshooting

This Section of the Presentation will cover troubleshooting the Main Board. Upon completion of this Section the technician will have a better understanding of the operation of the circuit and will be able to locate voltage and resistance test points needed for troubleshooting and alignments.

- DC Voltage and Waveform Checks
- Resistance Measurements

Operating Voltages		
	SMPS Supplied	5V 12V 16V
	Developed on the Main Board	5V 3.3V (2) 2.5V 1.8V

Main PWB Layout and Identification



Main PWB Back Side (Regulator Checks)

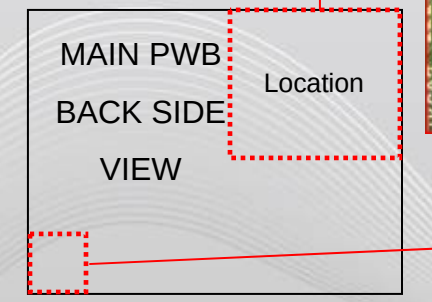
Bottom Leg Pin 1

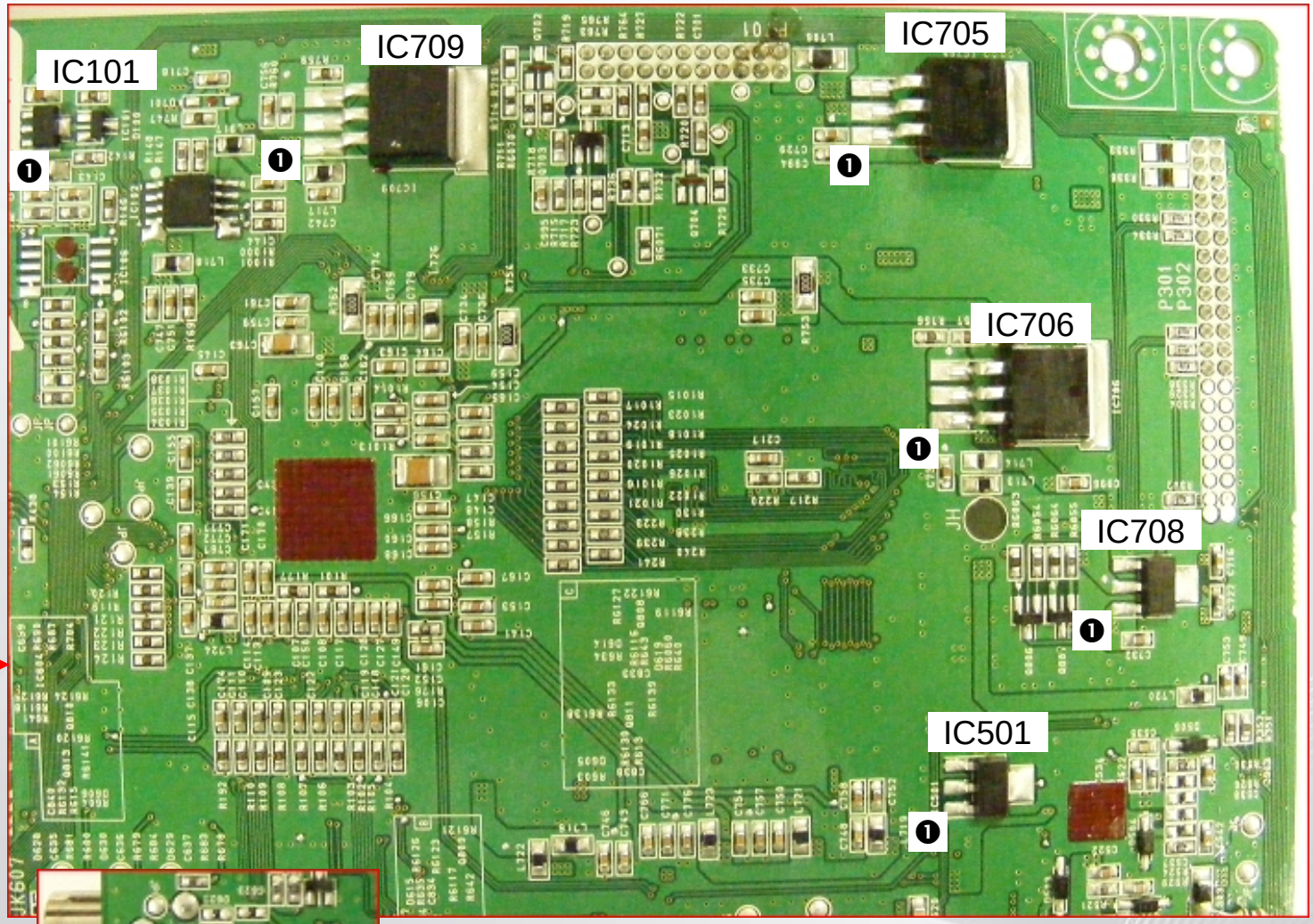
IC705		IC501	
1)	5V	1)	3.3V
2)	3.29V	2)	1.8V
3)	0V	3)	0V

IC706		IC805	
1)	5V	1)	5V
2)	2.6V	2)	3.3V
3)	1.37V	3)	0V

IC708		IC101	
1)	5V	1)	5V
2)	3.31V	2)	0V
3)	0V	3)	5V

IC709	
1)	3.29V
2)	1.26V
3)	0V

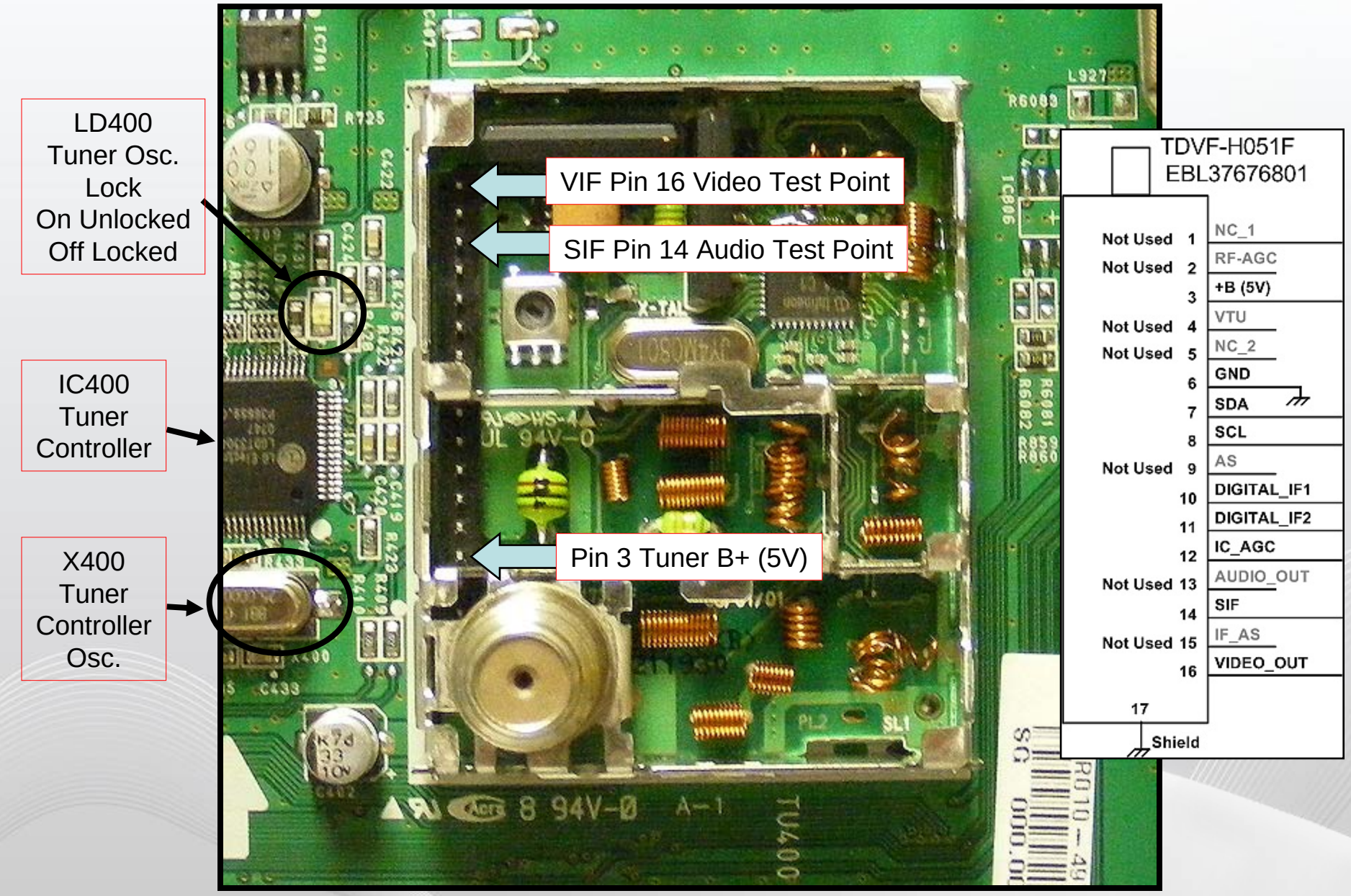




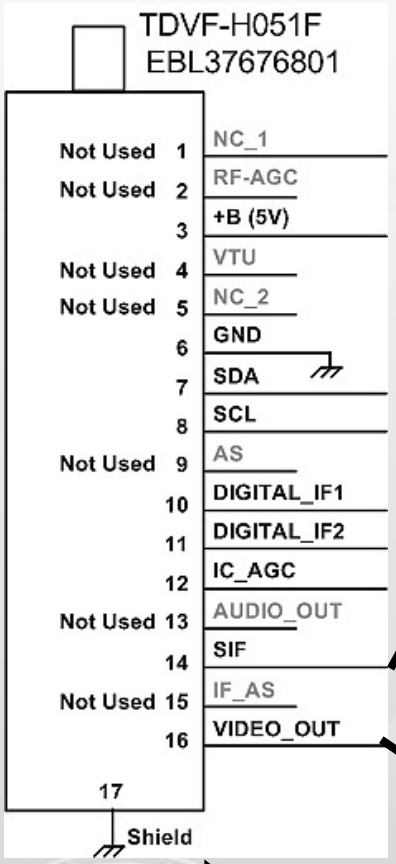
Be sure to prevent the PWB from touching the frame while the PWB is turned over.

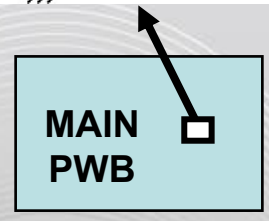
Use a piece of cardboard or towel to insulate.

Main PWB Tuner Check (Shield Off) Pins Exposed



Main PWB Tuner Video and SIF Output Check



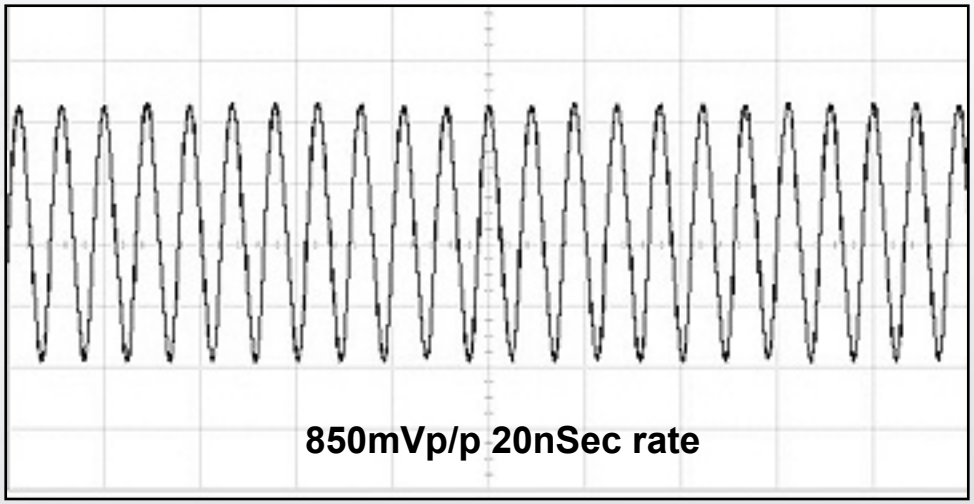


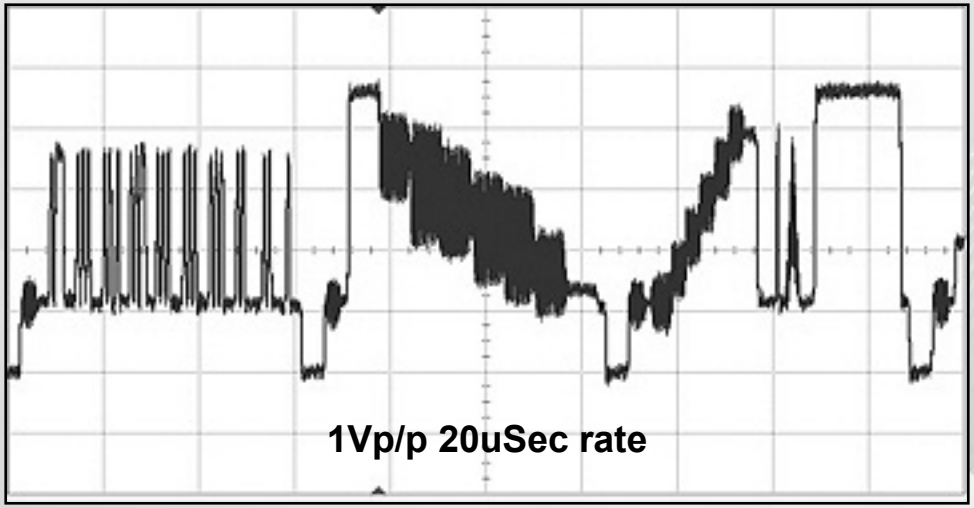
Tuner Location

Pin 14
"SIF"
Signal

Pin 16
"Video"
Signal

USING COLOR BAR SIGNAL INPUT





Main PWB Plug P302 "LVDS" Resistance

Voltage and Resistance Measurements for the Main Board

P302 CONNECTOR "Main" Odd Pins to P121 "Control PWB"

Pin	SBY	Run	Diode Mode
1	0V	0V	Open
3	0V	0V	Open
5	Gnd	Gnd	Gnd
7	Gnd	Gnd	Gnd
9	0.89V	3.29V	1.97V
11	0V	1.25V	1.17V
13	0V	1.25V	1.17V
15	0V	1.27V	1.17V
17	0V	1.22V	1.17V
19	0V	1.24V	1.17V
21	0V	1.24V	0.83V
23	0V	0.58V	1.01V
25	0V	3.29V	Open

P302 CONNECTOR "Main" Even Pins to P121 "Control PWB"

Pin	SBY	Run	Diode Mode
2	0V	0V	Open
4	0V	0V	Open
6	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd
10	0.89V	3.29V	1.97V
12	0V	1.21V	1.17V
14	0V	1.21V	1.17V
16	0V	1.21V	1.17V
18	0V	1.25V	1.17V
20	0V	1.21V	1.17V
22	0V	1.18V	1.17V
24	0.93V	3.29V	1.5V
26	Gnd	Gnd	Gnd

Resistance Readings with the PWB Disconnected. DVM in the Diode mode.

Main PWB Plug P303 Voltages

Voltage and Resistance Measurements for the Main Board

P303 CONNECTOR "MAIN PWB" to "Front Keys"

Pin	STBY	Run	Diode Mode
1	5V	5V	2.99V
2	Gnd	Gnd	Gnd
3	0V	3.29V	1.18V
4	Gnd	Gnd	Gnd
5	0V	3.29V	1.18V
6	Gnd	Gnd	Gnd
7	5V	5V	0.75V
8	Gnd	Gnd	Gnd
9	0V	0V	1.12V
10	Gnd	Gnd	Gnd
11	0V	3.84V	1.03V
12	Gnd	Gnd	Gnd

Resistance Readings with the PCB Disconnected. DVM in the Diode mode.

Main PWB Plug P701 Voltages "Odd Pins"

Voltage and Resistance Measurements for the Main Board P701

P701 CONNECTOR "Main" Odd Pins to "SMPS PWB" P813

Pin	Label	STBY	Run	Diode Mode
1	15V	0V	16.5V	3.8V
3	Gnd	Gnd	Gnd	Gnd
5	NC	NC	NC	Open
7	Gnd	Gnd	Gnd	Gnd
9	5V	5V	5V	0.75V
11	5V	5V	5V	0.75V
13	Gnd	Gnd	Gnd	Gnd
15	Gnd	Gnd	Gnd	Gnd
17	5_V Det	.15V	5V	3.25V
19	RL_On	0V	3.73V	Open
21	M5V_ON	0V	3.24V	1.22V

Resistance Readings with the PWB Disconnected. DVM in the Diode mode.

Main PWB Plug P701 Voltages "Even Pins"

Voltage and Resistance Measurements for the Main Board P701

P701 CONNECTOR "Main" Even Pins to "SMPS PWB" P813

Pin	Label	STBY	Run	Diode Mode
2	15V	0V	16.5V	2.82V
4	Gnd	Gnd	Gnd	Gnd
6	NC	NC	NC	Open
8	Gnd	Gnd	Gnd	Gnd
10	5V	5V	5V	0.75V
12	5V	5V	5V	0.75V
14	Gnd	Gnd	Gnd	Gnd
16	Gnd	Gnd	Gnd	Gnd
18	AC Det	5V	5V	Open
20	Vs_On	0V	3.2V	1.22V
22	AUTO	Gnd	Gnd	Gnd

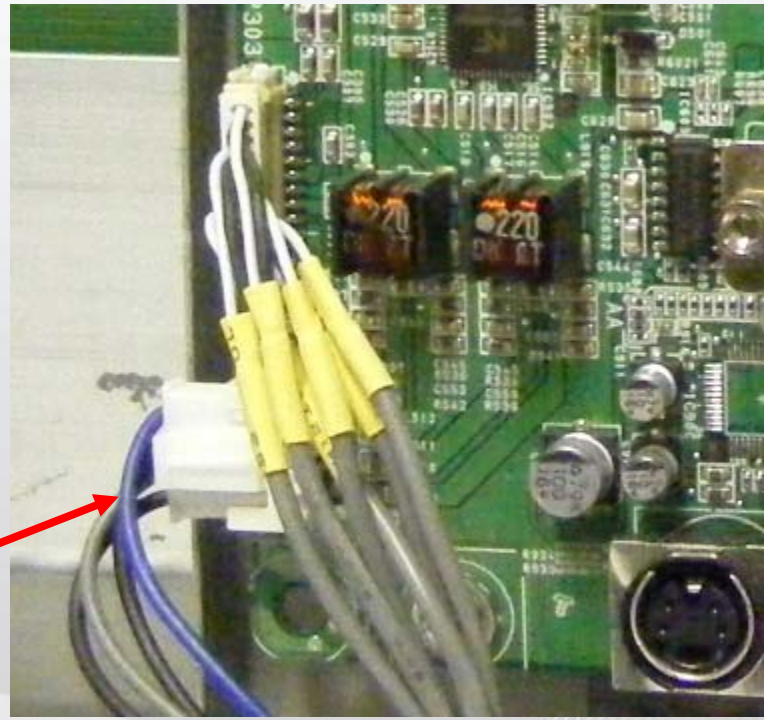
Resistance Readings with the PWB Disconnected. DVM in the Diode mode.

Main PWB Speaker Plug JK501 Voltages and Resistance

Voltage and Resistance Measurements for the Main Board Speaker Plug

CN701 CONNECTOR "Main" to "Speakers"

Pin	SBY	Run	Diode Mode
1	0V	8V	2.58V
2	0V	8V	2.58V
3	0V	8V	2.58V
4	0V	8V	2.58V

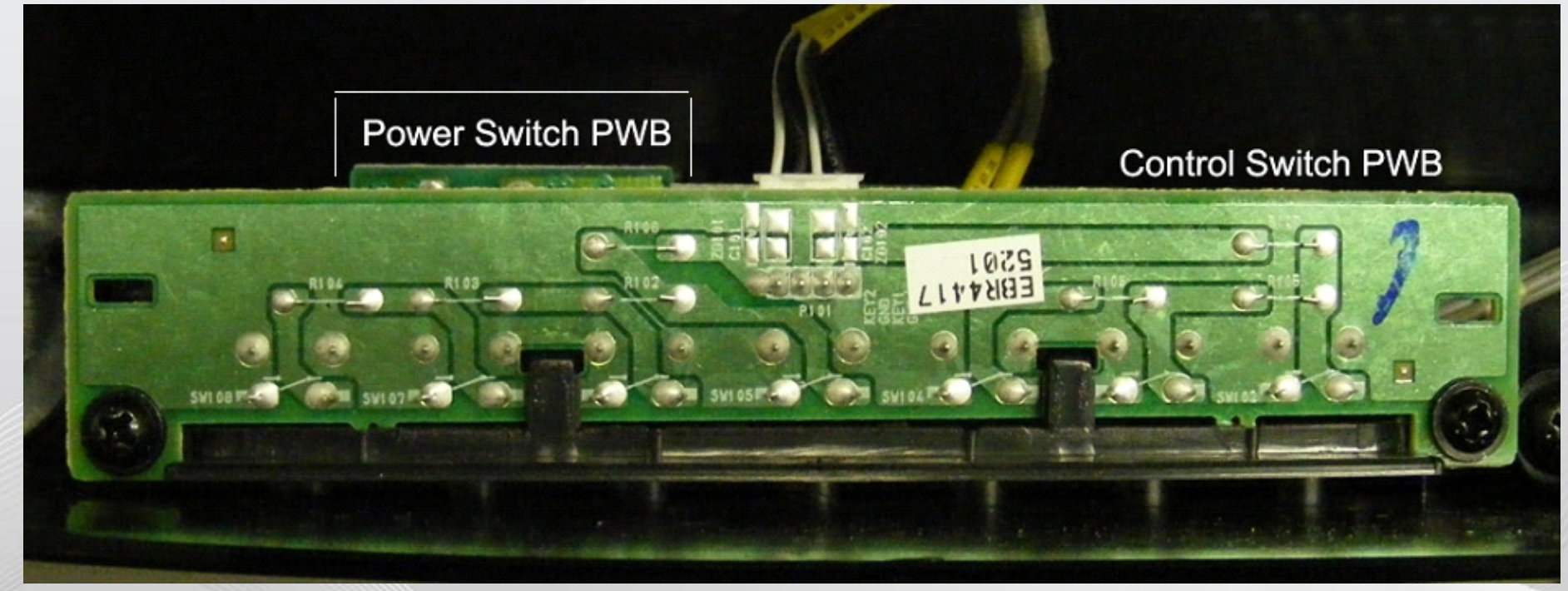


Resistance Readings with the PWB Disconnected. DVM in the Diode mode.

Ft Control PWB and Power Switch PWB Removal

The Control Switch PWB and Power Switch PWB are located (as viewed from the rear) in the lower left hand section.

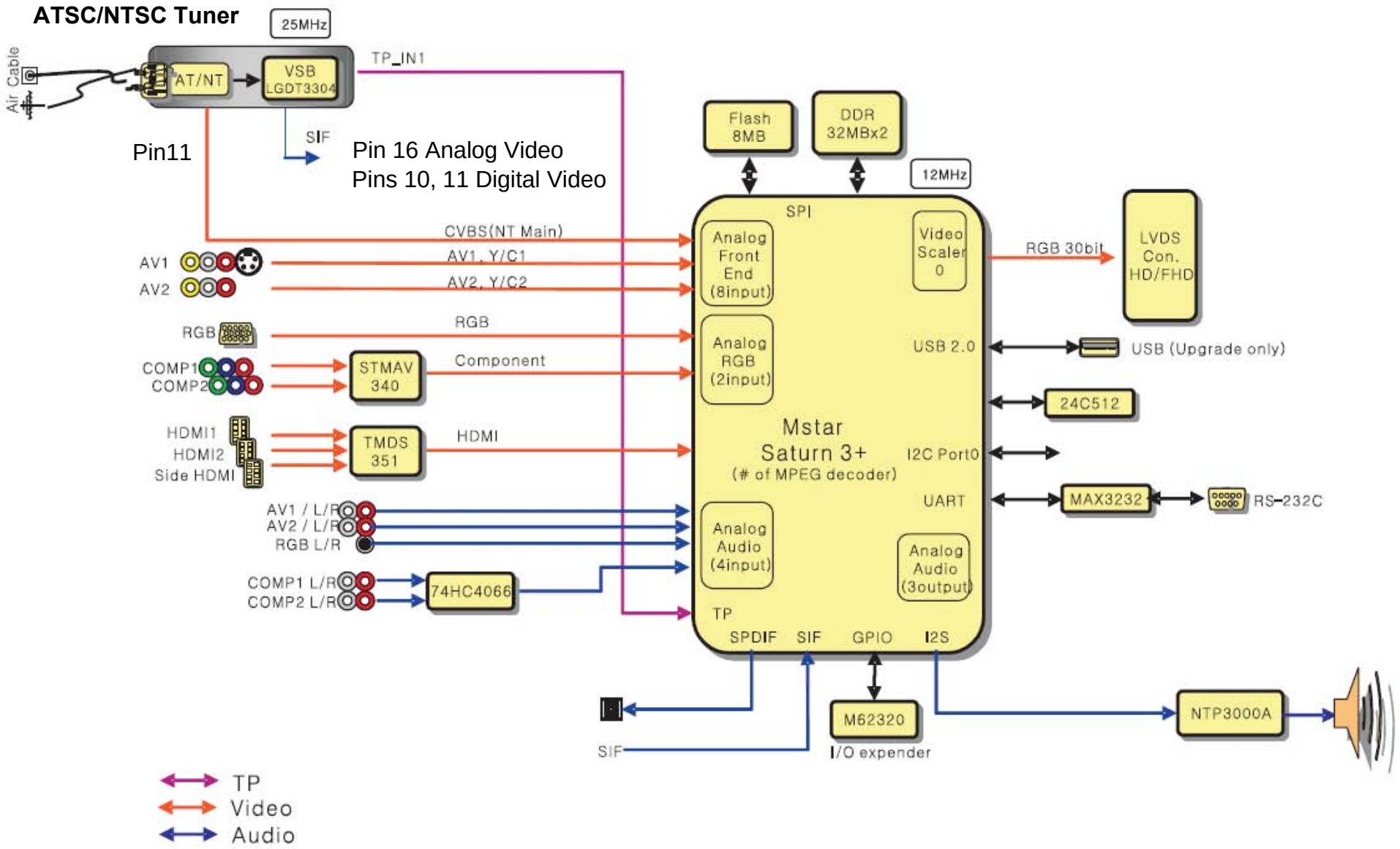
To remove, unplug the connector P101 and remove the 2 screws. Under each screw there is a black tab. Release these tabs to lift the PWB upward. Then remove the connector from the Power Switch PWB and remove it's two screws.



The following section gives a block diagram and isolates the location related to different circuits related to signal flow.

Use this block diagram to help isolate the problem.

Block Diagram Analog and Digital Inputs



No Picture (Sound Ok) Look for Reset

"No raster" in details

(1) Check and see if LED's are lit on the CTRL B/D. Missing check for 5VDC No Reset Occurs and no waveforms present to drive the display panel! Check M5V_ON going high on the SMPS Board P803 Pin 21.

↓

(2) Check for VS, VA from SMPS. Missing check Resistances, look for possible shorts on the Y and Z SUS Boards. Check VS ON (Pin 20 P803), going high on the SMPS Board from the Main Board. No Reset Occurs.

↓

(3) Check Waveforms at C213 Y-SUS, and C404 Z-SUS, if missing or distorted check on the Power Supply for VS, Y SUS BD for VSC,V Set Down, V SET UP, Z SUS BD Z Bias. No Reset

↓

(4) Examine Scan IC's on Y Drive Boards use Diode Check No Reset

↓

(5) Check LVDS cable from Main to CTRL B/D, Short Pins of Test Pattern TP CTRL B/D Test Patterns Reset Occurs

↓

(6) Check VA to the X Boards Reset Occurs

SECTION 5: 11X17 Foldout section in the Paper Training Manual

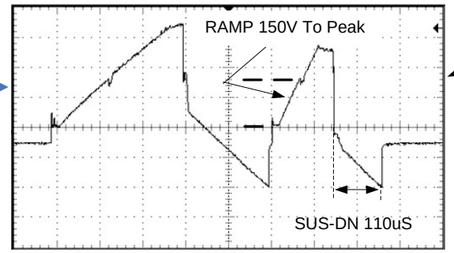
The following section gives is a section using exploded views of the 11X17 foldout which is provided in the Paper Manual.

This fold out is provide as a Quick guide to troubleshooting tips giving through out this presentation.

Special Note:
This foldout has changed since the publication of the original Training Manual. Please use the information contained here instead of the original paper fold out.

42PG20 CIRCUIT INTERCONNECT DIAGRAM

Y-SUS DRIVE WAVEFORM



4mS

Ch1	100V	100us	540Vp/p

62V~57V (AC) rms (Dark to White)

Y-SUS TP

P1 P2 P3 P4 P5 P6 P7 P8

Waveform TP

P100 P204 P200 P211

Y-SUS Drive

5V Fuse FL1 C18

-VY TP R210

VSC TP R211

VR601 Set-dn

VR602 Ramp

VSC VR501

-VY VR502

VZB VR905

VZB TP R946

FS202 (VS) 125V 4A Glass

FS701 (VA) 125V 10A

Fusable Link

P202

Y-SUSTAIN

No IPMs

P201 P801 P101

Fusable Link

FS201 (5V) 125V 1.5A

To Check 5V to the Y Drive, measure across capacitor C18.
The voltage is supplied thru FL1.

P202

Pin	Label	STBY	Run
1	Gnd	Gnd	Gnd
2	Gnd	Gnd	Gnd
3	15V	0V	15.8V
4	ER2	0V	61.5V
5	ER2	0V	61.5V
6	Va	0V	64.9V
7	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd
9	15V	0V	15.8V
10	ER1	0V	61.5V
11	ER1	0V	61.5V
12	Va	0V	*64.9V

*Varible according to Label

P201

Pin	Label	STBY	Run
1	Vs	0V	*194V
2	Vs	0V	*194V
3	nc	nc	nc
4	Gnd	0V	0V
5	Gnd	0V	0V
6	Va	0V	*65V
7	Va	0V	*65V
8	Gnd	0V	0V
9	M5V	0V	5V
10	M5V	0V	5V

*Variable according to Label

P812

Pin	STBY	Run
1	0V	*195V
2	0V	*195V
3	0V	0V
4	n/c	n/c
5	0V	0V
6	0V	*65V
7	0V	*65V
8	0V	0V
9	0V	5V
10	0V	5V

P813

Pin	STBY	Run	No Load
1, 2	0V	16.5V	16.5V
3, 4	Gnd	Gnd	Gnd
5, 6	NC	NC	NC
7, 8	Gnd	Gnd	Gnd
9, 10	5V	5V	5V
11, 12	5V	5V	5V
13, 14	Gnd	Gnd	Gnd
15, 16	Gnd	Gnd	Gnd
17	.15V	5V	5V
18	5V	5V	5V
19	0V	3.73V	0V
20	0V	3.2V	0V
21	0V	3.24V	0V
22	0V	0V	5V

P812

VS Adj R951

VA Adj R901

SMPS PCB POWER SUPPLY

P813

A/C IN CN101

SMPS Test – Unplug P813 If all supplies do not run when A/C is reapplied, disconnect P812 to isolate the excessive load. This supply will operate with no external load.

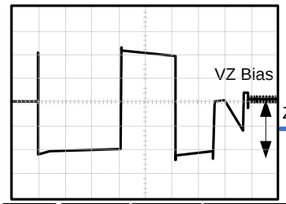
Remove all input signals from the unit so the menu will be the only video to be found on the LVDS cable.
NOTE: White noise from the tuner may cause these signals to vary. These were taken with the unit set to component with no input signal.

See next page for waveforms

P302

Pin	State	Ref#
11	Menu Off	10
	Menu On	11
12	Menu Off	08
	Menu On	09
13	Menu Off	12
	Menu On	13
14	Menu Off	06
	Menu On	07
15	Menu Off	14
	Menu On	15
16	Menu Off	04
	Menu On	05
19	Menu Off	16
	Menu On	17
20	Menu Off	02
	Menu On	03
21	Menu Off	18
	Menu On	19
22	Menu Off	00
	Menu On	01

Z-SUS



Z-SUS TP

Ch1	50.0V	100us	220Vp/p

52V (AC) rms

Z-SUS TP R1 Bottom Leg

P2 P1 P3

Z-SUSTAIN

DIGITAL PCB: Remove all input signals from the unit so the menu will be the only video to be found on the LVDS cable.
NOTE: White noise from the tuner may cause these signals to vary. These were taken with the unit set to component with no input signal.

No Connection

P164 P131 P121 TEMP LEDS

IC121 X101 50 Meg

Pin 1 (5V)
Pin 2 (3.3V)
Pin 3 (0V)

ROM Updates

D15 D16 D17

With the unit on. If none of D15, 16, 17 are illuminated. Check supplies to the PCB. If they are present replace the Control PCB

CONTROL PCB

FL111 FL112 5V Fuses

P160 IC122 P161 P162

Auto Gen

Pin 1 (5V)
Pin 2 (3.3V)
Pin 3 (0V)

Unplug all connectors. Jump 5V from SMPS (P813 pins 9~12) to pin 1 of IC121. Observe Temp LEDs. If they light, most likely Control PWB is OK. 1st check FL111 and FL112.

Disconnect P201 from the Y SUS Board and connect a Jumper from Pin 10 of P812 (M5V) to Pin 10 P201 (5V). The 5V will be routed to the Control Board via FS201, Ribbon Cable P101 on the Y SUS Board and FL111 and FL112 on the Control Board for Control Board operation verification.

Short across the two points labeled Auto Gen to generate a test pattern.

* If the complaint is no video and shorting the points (AutoGen) causes video to appear suspect the Digital PCB.

LD703 Lights Red in Stby. 5VSBY from SMPS OK. Set on, Lights Red 5V General OK. Appears Amber

**LD400 lit during initialization. Tuner lock OK turns LED off.

LVDS P701 IC705 IC709 IC101 Reset IC702

P302 IC706 Q706 LD703 IC708 IC501

MAIN PCB

IC100 Micro

**LD400 X400 25 Meg Run Only

X100 12 Meg 1.5V SBY

Pin 16 Pin 1 TUNER

TUNER Pin 16 Video Pin 14 SIF

P303 JK501

To keys and IR

To Speakers

* Grayed Out ICs are located on Back

Pin 1 IC805

IC702	IC709
5) .29V	1) 3.29V
4) 5V	2) 1.26V
3) 0V	3) 0V
2) 0V	
1) 0V	IC501
	1) 3.3V
IC705	2) 1.8V
1) 5V	3) 0V
2) 3.29V	
3) 0V	IC805
	1) 5V
IC706	2) 3.3V
1) 5V	3) 0V
2) 2.6V	
3) 1.37V	
IC708	IC101
1) 5V	1) 5V
2) 3.31V	2) 0V
3) 0V	3) 5V

Va and 16V

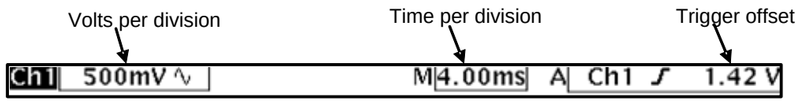
P232 P211 P311 P331

LEFT X DRIVE

P201 P202 P203 P204 P205 P206

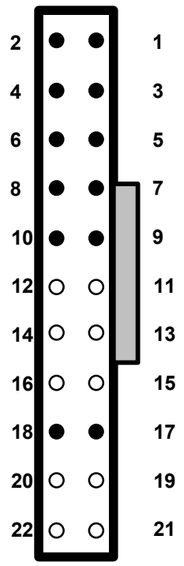
RIGHT X DRIVE

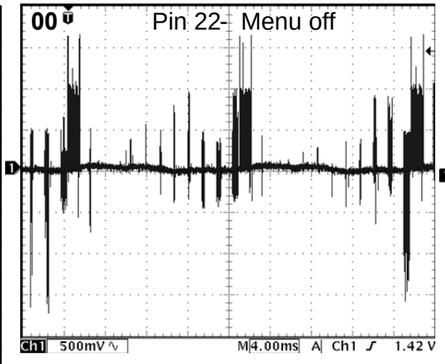
P301 P302 P303 P304 P305 P306

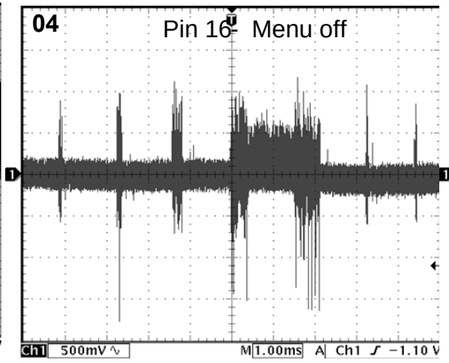


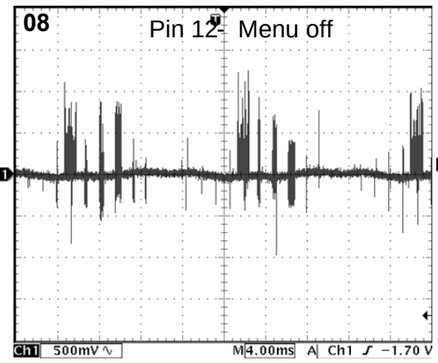
P302		
Pin	**State**	**Ref #**
11	Menu Off	10
	Menu On	11
12	Menu Off	08
	Menu On	09
13	Menu Off	12
	Menu On	13
14	Menu Off	06
	Menu On	07
15	Menu Off	14
	Menu On	15
16	Menu Off	04
	Menu On	05
19	Menu Off	16
	Menu On	17
20	Menu Off	02
	Menu On	03
21	Menu Off	18
	Menu On	19
22	Menu Off	00
	Menu On	01

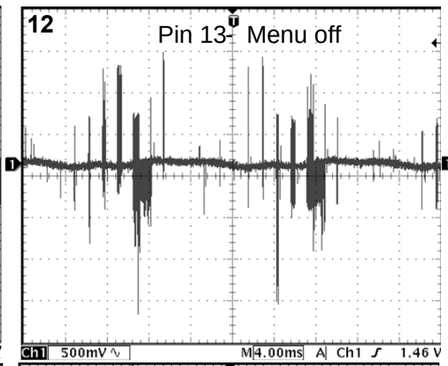
Connector P302 Configuration
○ - indicates signal pins.

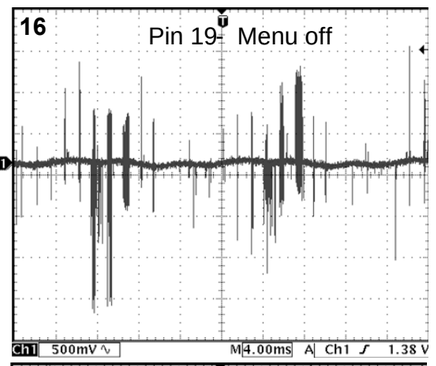


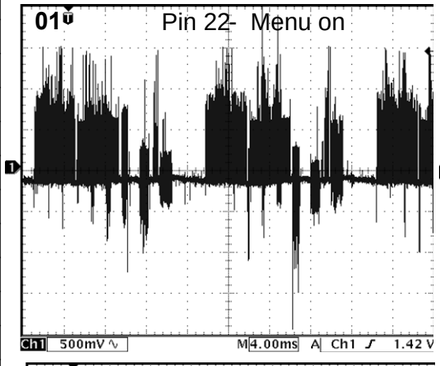


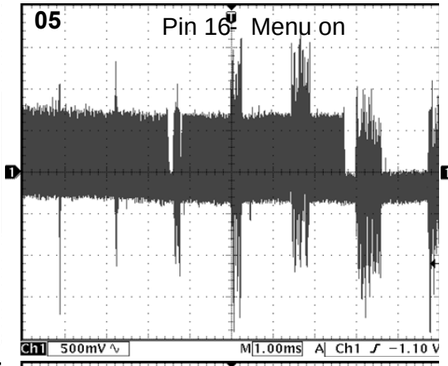


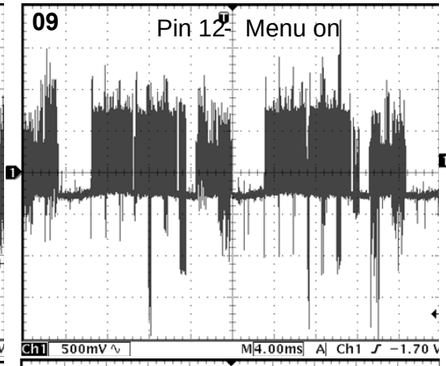


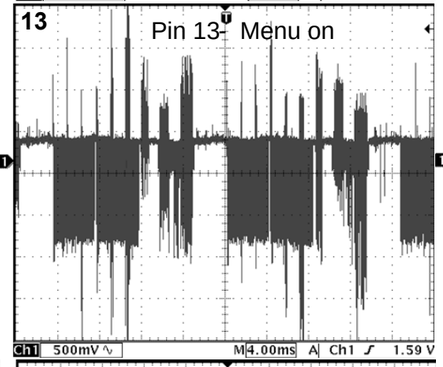


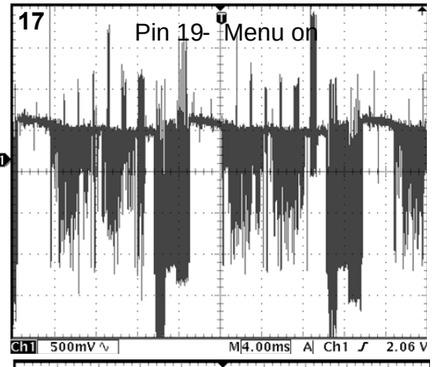


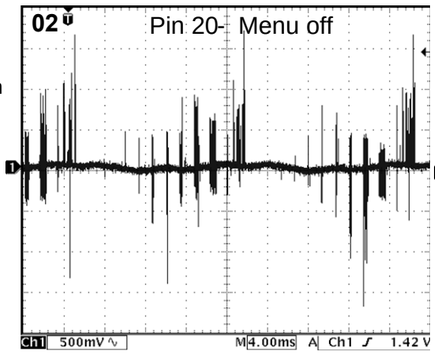


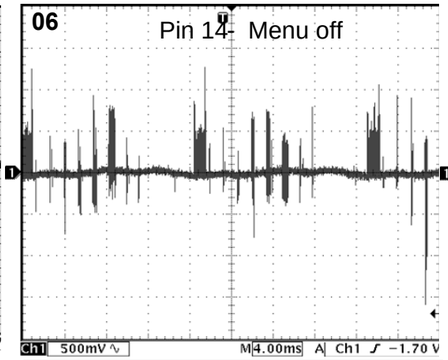


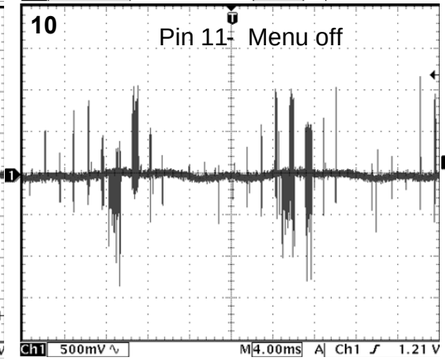


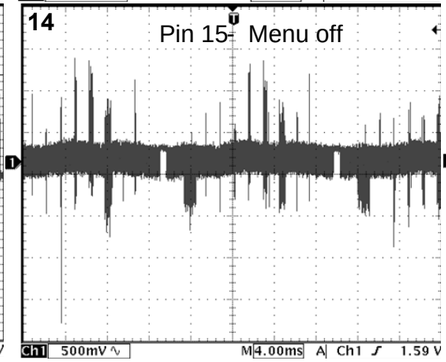


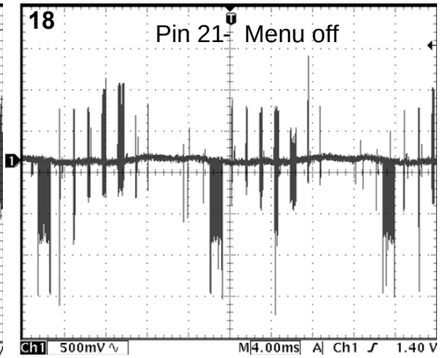


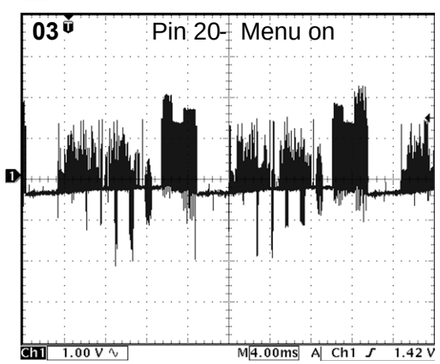


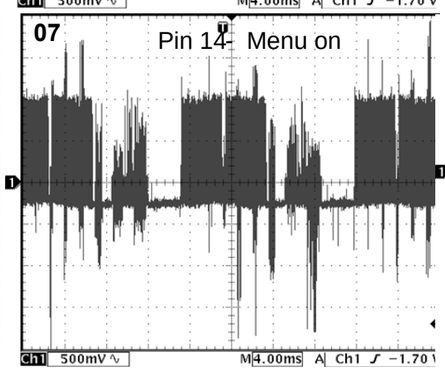


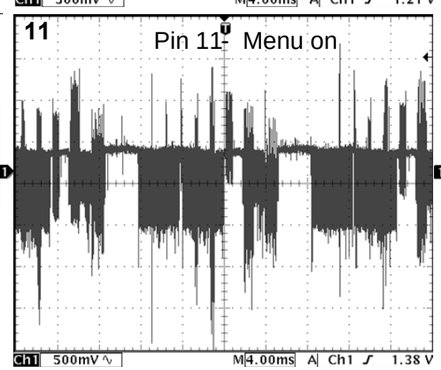


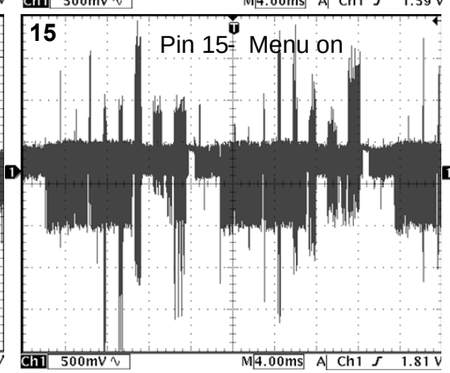


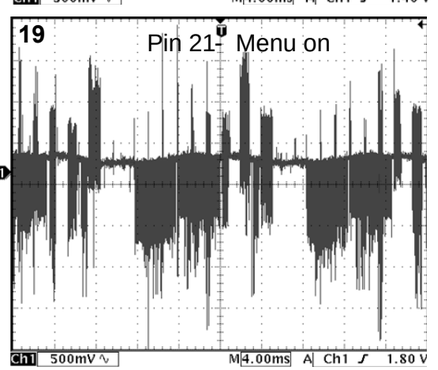












This concludes the Presentation

Thank You